EG&G ROCKY FLATS

ROCKY FLATS PLANT SITE-WIDE

QUALITY ASSURANCE PROJECT PLAN

FOR CERCLA REMEDIAL INVESTIGATIONS/FEASIBILITY STUDIES

AND

RCRA FACILITY INVESTIGATIONS/CORRECTIVE MEASURES STUDIES

ACTIVITIES

ENVIRONMENTAL RESTORATION PROGRAM

ROCKY FLATS PLANT

GOLDEN, COLORADO

TABLE OF CONTENTS

This is a
TITLE: ACRONYMS AND ABBREVIATIONS
UNTROLLED DOCUM.

EG&G — ROCKY FLATS PLANT
ENVIRONMENTAL MANAGEMENT DEPARTME.

Approved By:

5/7/91
Director, Environmental Management

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ACRONYMS AND ABBREVIATIONS

ANSI	American National Standards Institute
ARAR	Applicable or Relevant and Appropriate Requirement
ASME	American Society of Mechanical Engineers
CAA	Clean Air Act
CAR	Corrective Action Report
CDH	Colorado Department of Health
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CHWA	Colorado Hazardous Waste Act
C-O-C	Chain-of-Custody
CLP	Contract Laboratory Program
DOE	U.S. Department of Energy
DQO	Data quality objectives
EE	Environmental Evaluation
EMAD	Environmental Monitoring and Assessment Division
EPA	U.S. Environmental Protection Agency
ER	Environmental Restoration
FS/CMS	Feasibility Study/Corrective Measures Study
GRRASP	General Radiochemistry and Routine Analytical Services Protocol
HMWM	Colorado Department of Health Hazardous Materials and Waste Management Division
IAG	Federal Facility Agreement and Consent Order (Interagency Agreement)
IHSS	Individual Hazardous Substance Sites
IRA/IM	Interim Remedial Action/Interim Measures

M&TE	Measuring and test equipment
NCP	National Oil and Hazardous Substances Contingency Plan (of CERCLA)
NCR	Nonconformance Report
NEPA	National Environmental Policy Act
NIST	National Institute for Standards and Technology [formerly known as the National Bureau of Standards (NBS)]
OSHA	Occupational Safety and Health Administration
OU	Operable Unit
PARCC	Precision, accuracy, representativeness, comparability, and completeness
PCB	Polychlorinated Biphenyl
PM	Project Manager
POC	Point-of-Contact
QA	Quality Assurance
QAA	Quality Assurance Addendum
QAC	Quality Assurance Coordinator
QAPM	Quality Assurance Program Manager
QAPjP	Quality Assurance Project Plan (also denotes QAPP as defined in the IAG)
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
RFEDS	Rocky Flats Environmental Data System
RFI/CMS	Facility Investigations/Corrective Measures Studies
RFI/RI	RCRA Facility Investigation/Remedial Investigation
RFO	Rocky Flats Officer
RFP	Rocky Flats Plant
RI/FS	Remedial Investigation/Feasibility Study
RPD	Remediation Programs Division
SAP	Sampling and Analysis Plan
SOP	Standard Operating Procedure
SOPA	Standard Operating Procedure Addendum
SOW	Statement of Work

TITLE: INTRODUCTION AND SCOPE

Approved By:

5/7/91
Director, Environmental Management

TABLE OF CONTENTS

1.0 QA PROJECT PLAN PURPOSE

The purpose of this Quality Assurance Project Plan (QAPjP) is to identify the Quality Assurance (QA) requirements, and specific measures for implementing these requirements, that are applicable to the quality-affecting investigation and remediation activities at locations on the Rocky Flats Plant (RFP) site. To avoid confusion the acronym QAPjP is used and denotes the Quality Assurance Project Plan (QAPP) defined in the IAG. (Collectively, these activities will be referred to as "environmental restoration" activities.) The locations requiring investigation and potential remediation are identified and agreed to in the "Federal Facility Agreement and Consent Order" referred to as the Interagency Agreement (IAG), dated January 1991, between the U.S. Department of Energy (DOE), the U.S. Environmental Protection Agency (EPA), and the Colorado Department of Health (CDH). The level of detail in this QAPjP takes into consideration the potential for environmental releases, potential regulatory concerns, DOE orders, environmental laws, EPA guidance, and public visibility.

2.0 QA PROJECT PLAN SCOPE

This QAPjP is applicable to RFP Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Remedial Investigation/Feasibility Studies (RI/FS) and Resource Conservation and Recovery Act (RCRA) Facility Investigations/Corrective Measures Studies (RFI/CMS) for the operable units identified for investigation and potential remedial action as outlined in the draft IAG. This QAPjP does not address routine environmental monitoring which does not support the studies outlined in the IAG.

Examples of activities performed by the Environmental Restoration (ER) Department which fall under the scope of this QAPjP are:

- CERCLA Remedial Investigations (RI) to identify, confirm, and quantify contamination.
- CERCLA Feasibility Studies (FS) to develop remediation alternatives.
- CERCLA Risk Assessments including Human Health Risk Assessments/Environmental Evaluation Assessments.
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- RCRA Section 3004(u) actions associated with Solid Waste Management Units (SWMUs) that would meet the definition of past disposal sites under the ER Program. CERCLA actions associated with Individual Hazardous Substance Sites (IHSS).

- Interim Remedial Action/Interim Measures (IRA/IM).

- National Environmental Policy Act (Documentation).

- Treatability Studies.

For the purposes of the EM Department QA Program, the use of "shall" and "will" are specifically defined. "Shall" is used when an auditable requirement is invoked. Every "shall" requires documentation of the cited action to create an auditable record. "Will" is used to denote guidance or recommended actions that do not necessarily require auditable documentation.

3.0 BASIS FOR ENVIRONMENTAL RESPONSE ACTIVITIES

Included in Attachment 2 of the IAG is the "Rocky Flats Plant US DOE Federal Facility Agreement Statement of Work" (IAG SOW) which sets forth elements of work required to be performed during the investigation and study phase of the response process. As stated in the IAG SOW, "All environmental response activities performed by DOE and its operating contractor, EG&G, and EG&G subcontractors will be consistent with CERCLA, the National Oil and Hazardous Substances Contingency Plan (NCP), RCRA, and applicable State law. At a minimum, all environmental response activities will also be consistent with:

- Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA, Interim Final, October 1988.

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4.0 BASIS FOR QA REQUIREMENTS

In addition to the above, QA requirements have been identified, primarily based on guidance elements included in EPA QAMS/005/80, Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans, and the guidance documents referenced in the IAG. Applicable requirements from DOE Orders 5700.6B, Quality Assurance, and 5400.1, General Environmental Protection Program, both of which incorporate QA requirements from ASME NQA-1, have been included in this document to more completely describe the applicability of QA management controls over a given program area. The basis for the QA requirements included in this QAPjP are discussed in further detail in Section 2.1.

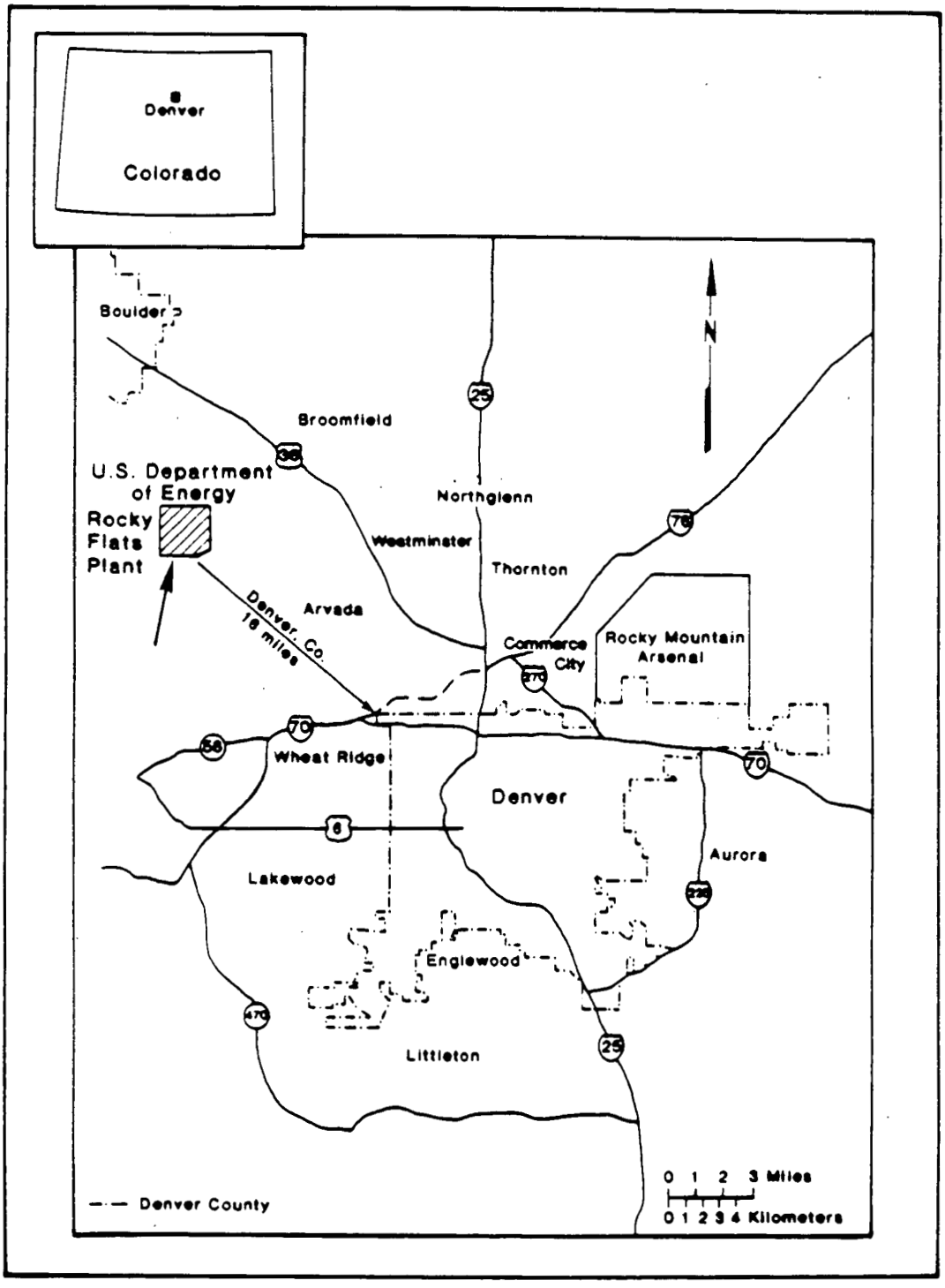
5.0 PROJECT DESCRIPTION

The RFP is located in northern Jefferson County, Colorado, approximately 16 miles northwest of Denver (See Figure i-1). The plant consists of approximately 6,550 acres of federally owned land in Sections 1 through 4 and 9 through 15, of T2S, R70W, 6th principal meridian. Major buildings are located within a security area of approximately 400 acres. The security area is surrounded by a buffer zone of approximately 6,150 acres.

The RFP is a government-owned, contractor-operated facility. It is part of DOE's nationwide nuclear weapons research, development, and production complex and is administered by DOE's Rocky Flats Office. The management and operating contractor for the RFP is EG&G Rocky Flats, Inc. The facility manufactures components for nuclear weapons and has been in operation since 1951. RFP fabricates components from plutonium, uranium, beryllium, and stainless steel. Production activities include metal fabrication, machining, and assembly. Both radioactive and nonradioactive wastes are generated in the process. Current waste handling practices involve on-site and off-site recycling of hazardous materials and off-site disposal of solid radioactive materials at other DOE facilities.

Figure i-1

LOCATION OF THE ROCKY FLATS PLANT



The RFP is currently regulated under the Colorado Hazardous Waste Act (CHWA) for treatment, storage, and corrective action, and is an interim status hazardous waste treatment/storage facility. In the past, both storage and disposal of hazardous, radioactive, and mixed wastes occurred at on-site locations.

As a result of past disposal and storage practices, there is a potential threat of hazardous substance releases at and from the RFP. The elements of work set forth in the IAG describe the work to be performed under the RFP Environmental Restoration Program to respond to all hazardous substance releases or threat of releases. The EG&G Rocky Flats EM Department is responsible for planning, implementation, and management of the Environmental Restoration Program at the RFP. The entire program is designed to investigate and remediate contaminated and potentially contaminated sites. The overall goal of the ER program is to ensure that risks to human health and the environment are eliminated or reduced to acceptable levels. The environmental response activities to be conducted during the investigation and study phase of the ER program are described below.

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SWMU	Solid Waste Management Unit
TCL	Target Compounds List
TAL	Target Analyte List
VTSR	Validated Time of Sample Receipt
VOC	Volatile Organic Compound
WP	Work Plan/Field Sampling Plan

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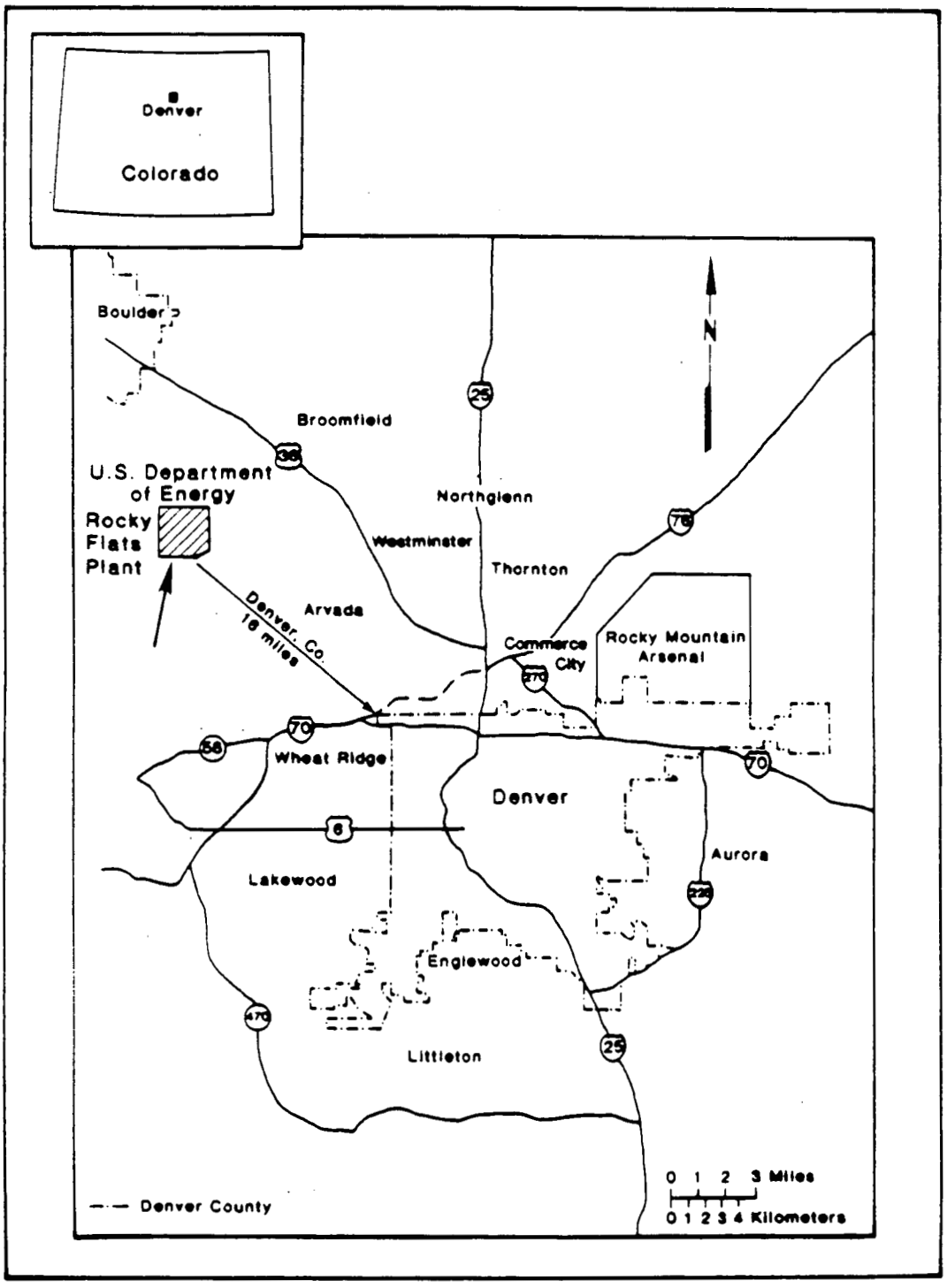

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TITLE: ORGANIZATION AND RESPONSIBILITIES Approved By:

5/2/91
Director, Environmental Management

TABLE OF CONTENTS

1.0 PURPOSE

This section describes the organization and authority for the development, implementation, and verification of the EM Department QA Program. This section also documents the organizational structure, functional responsibilities, levels of authority, and lines of communication established within the Department to achieve quality work and data.

2.0 ORGANIZATIONAL STRUCTURE AND RESPONSIBILITIES

Organizational structure and responsibility of assignments have been established to attain the following objectives:

- Achievement and maintenance of quality by those who have been assigned responsibility for performing the work.

- Verification of overall quality by qualified persons or organizations not directly responsible for performing the work.

The overall organization of EG&G Rocky Flats is shown in Figure 1-1. Figure 1-2 shows the organization of the Environmental Restoration and Waste Management Organization which include the EM Department. Figure 1-3 shows the organization of the EM Department. Individual site-wide responsibilities for the EM Department are discussed in Sections 1.3.1 through 1.3.8.

Within the EM Department, the Remediation Programs Division (RPD) is primarily responsible for the ER Program activities. The RPD Manager is responsible for approving procedures, instructions, and work plans for the ER Program. The RPD Manager shall appoint a manager for each Operable Unit (OU). The RPD manager shall also appoint EG&G project managers for specific functions at each OU (i.e., remedial investigations, feasibility studies, etc.). These OU and project managers shall be responsible for assuring that applicable Standard Operating Procedures (SOP) and Standard Operating Procedure Addenda (SOPA) requirements are implemented during the conduct of field activities.

The ER Program field and laboratory activities will be conducted primarily by contractors to EG&G Rocky Flats. The responsible contractor organization shall appoint a project manager (PM) for the specific work at each OU for which they are contracted. The contractor's PM shall select project staff to conduct the field work according to approved EG&G Rocky Flats plans, SOPs, and SOPAs. The contractor's project manager will report to the EG&G Rocky Flats OU project managers.

Figure 1-1
EG&G ROCKY FLATS

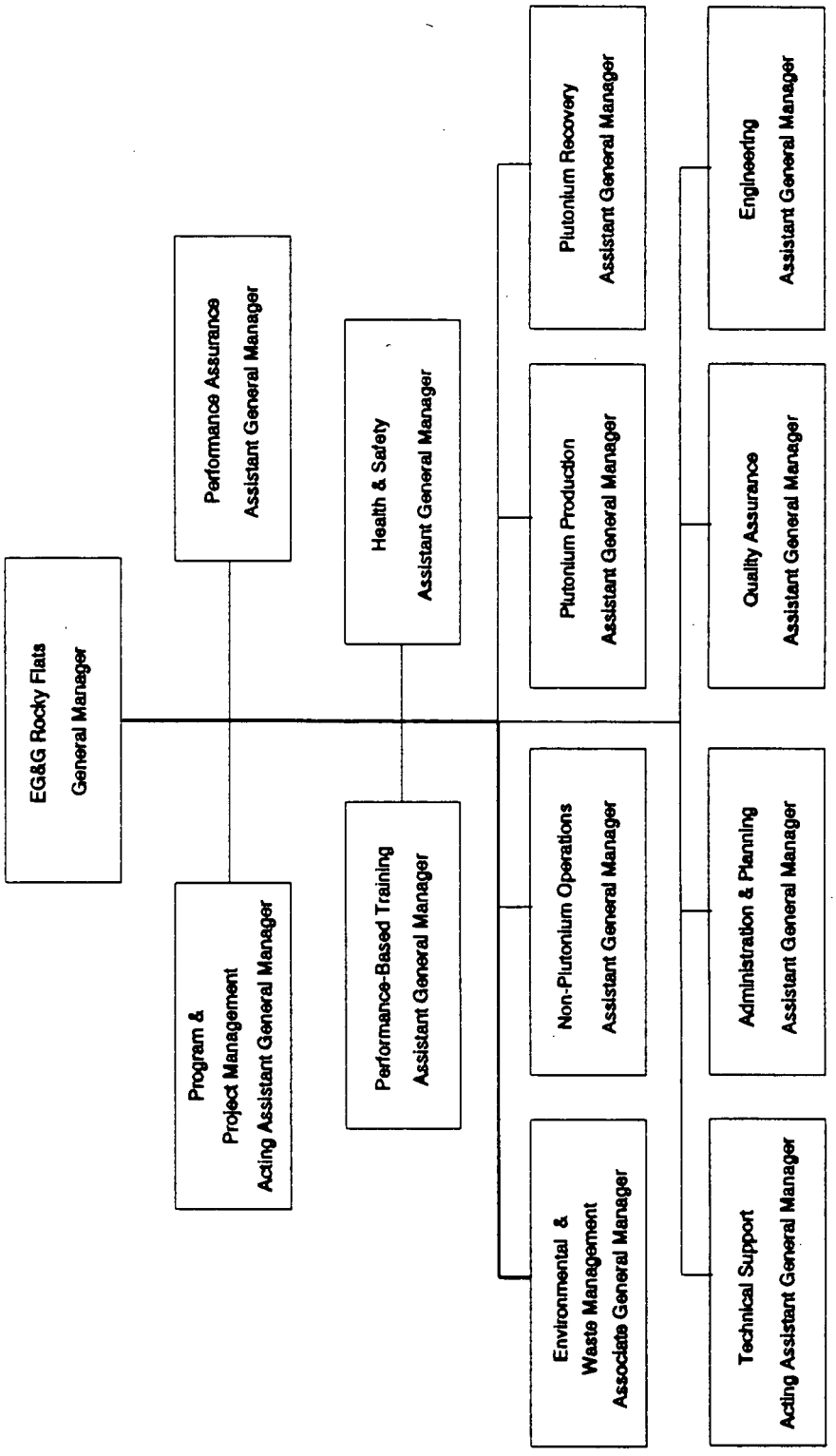


Figure 1-2

ENVIRONMENTAL & WASTE MANAGEMENT

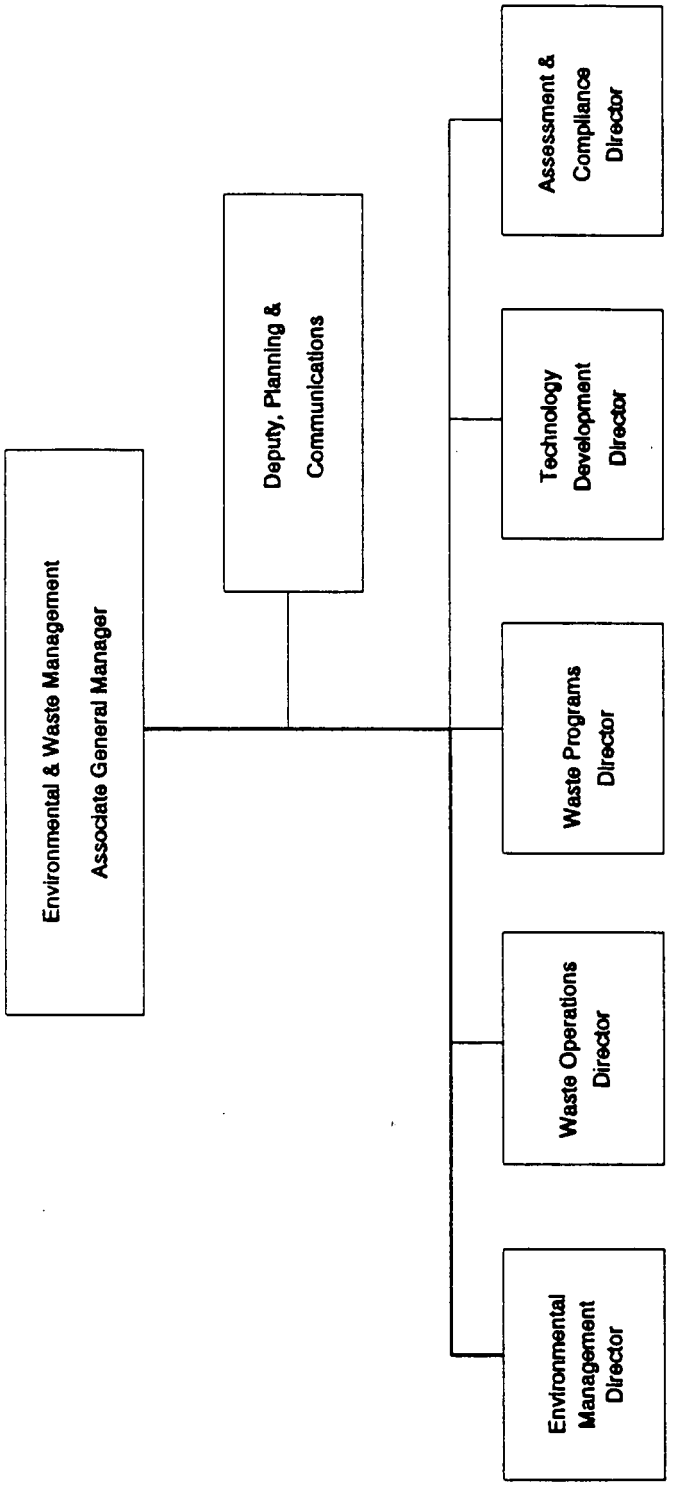
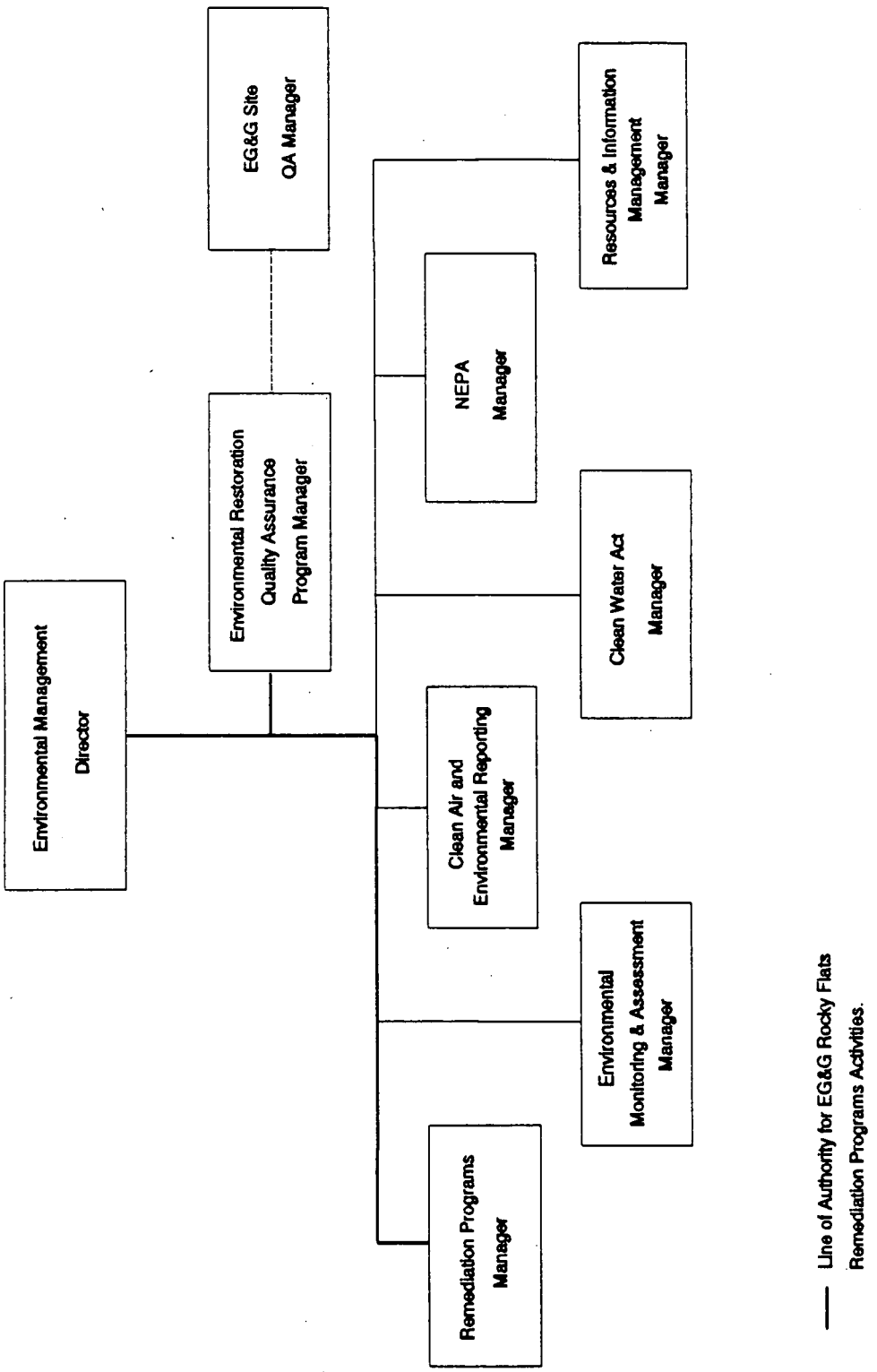


Figure 1-3

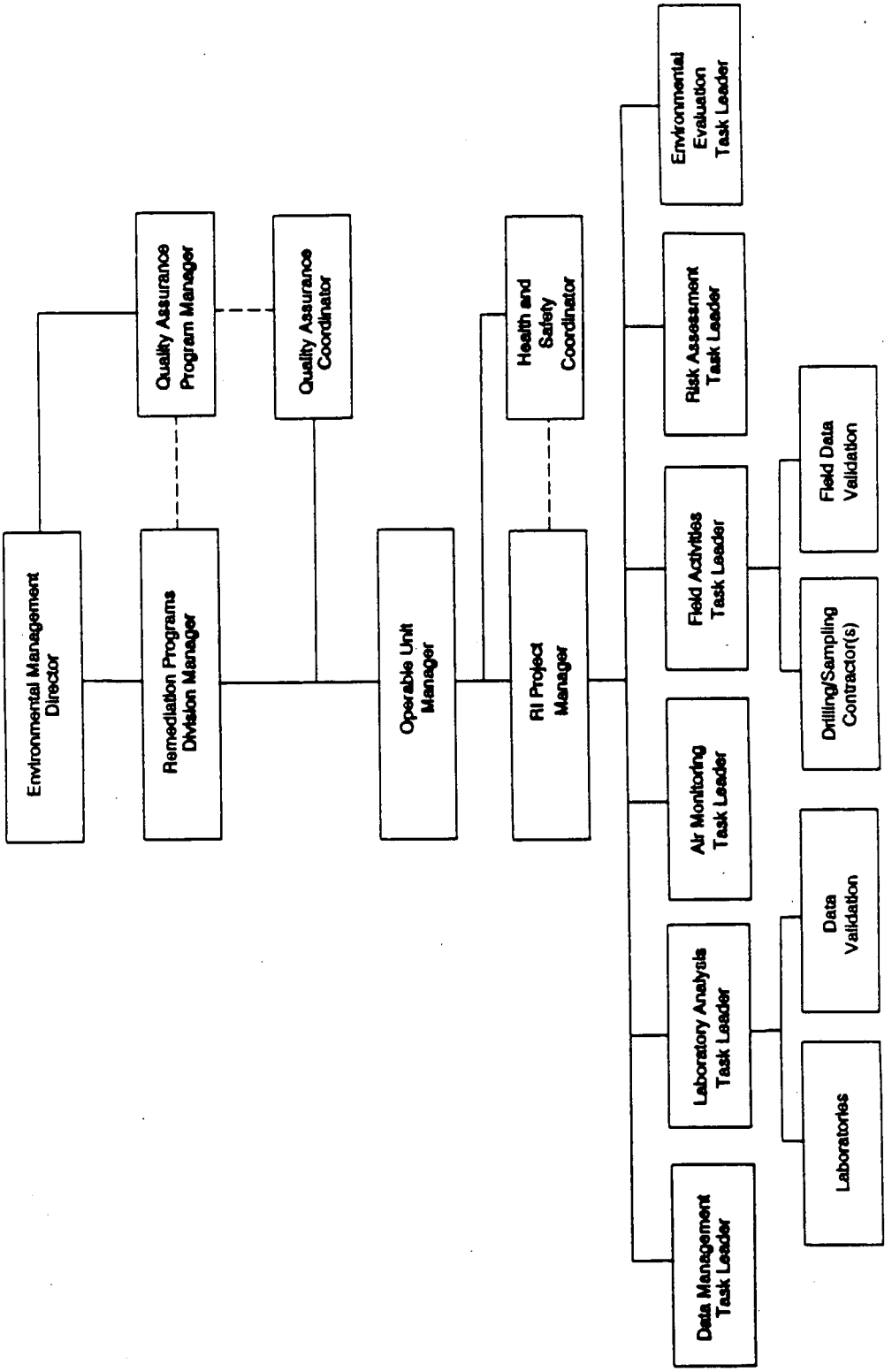
ENVIRONMENTAL MANAGEMENT



Other EM Department divisions and EG&G Rocky Flats departments will provide matrix support personnel to the RPD and OU project managers for implementation and supervision of RI/FS and RFI/CMS activities. For example, the EG&G Rocky Flats Health and Safety Department will provide health and safety and industrial hygiene support to the RPD Manager and OU project manager. EM Department division managers will appoint technical specialists to assist the OU project managers in overseeing and managing OU field activities. For example, the NEPA Division will provide technical support for environmental evaluations and risk assessments, the Environmental Monitoring and Assessment Division (EMAD) is responsible for data acquisition and management and reviews analytical requirements to determine if analytical specifications and capabilities are met, contracts and supervises analytical laboratories, performs data verification and validation, and conducts ambient air quality monitoring and meteorological monitoring. The EMAD Manager will appoint an analytical sample tracker (discussed later in Section 8.3.2) to track analytical results of field samples.

An example of the OU management structure for remedial investigation activities is illustrated in Figure 1-4. Since the contractors and the level of matrixed technical support will be different from OU to OU, the specific organizational structure and responsibilities shall be developed and presented in each OU Quality Assurance Addendum (QAA). The responsibilities for sampling, sample tracking, analysis, and data validation are discussed later in Section 8.3.2 and are illustrated graphically in Figure 8-1. The organizational structure and responsibilities discussed in the subsequent sections are for the higher level site-wide program.

Figure 1-4
PROJECT MANAGEMENT FOR AN OPERABLE UNIT
REMEDIAL INVESTIGATION PROJECT



2.1 Director, Environmental Management Department

The EM Department is responsible for planning and implementing all environmental restoration activities at the RFP. To accomplish this, the EM Department is comprised of the Remediation Programs, Environmental Monitoring and Assessment, Clean Air Act, Clean Water Act, and National Environmental Policy Act Divisions.

The EM Department Director's responsibilities include:

- Directing overall Department activities, including the establishment and execution of the QA Program and the assignment of an independent Quality Assurance Program Manager (QAPM).

- Directing the development of administrative or standard operating procedures as necessary which specify how the project requirements are to be implemented, and assuring the implementation of requirements in this QAPjP for all quality-affecting activities.

- Directing corrective actions and resolution of differences of opinion between the QAPM and other personnel involved in ER activities.

- Approving procedures, instructions, and plans issued at the Department level.

- Determining, in consultation with the QAPM and Division Managers, those documents which require distribution control.

- Directing internal verification of the QA Program implementation through audits, surveillance, management assessments, and internal and peer reviews.

- Directing that only properly trained and qualified/certified personnel are used (as applicable) to perform EM Department activities. This particularly applies to inspectors and auditors.

- Directing that nonconforming items are properly identified, segregated, and/or marked to prevent inadvertent use, and dispositioned in accordance with documented procedures.

- Directing that significant conditions adverse to quality are identified, evaluated, and properly dispositioned to include identification of root cause(s) and approving proposed corrective actions.

- Directing the development and implementation of procedures for the control of software used by EM Department to develop results that will be reported to regulators and others.

- Establishing, staffing, and directing a document control and records management system.

- Performing and documenting, via written report, annual appraisals that address the adequacy and effectiveness of the EM Department QA Program, including the requirements of this QAPjP. Input to this annual appraisal shall be provided by division managers.

2.2 Quality Assurance Program Manager

The QAPM assures the development, implementation and execution of the QA program. The achievement of quality work is directed by the division managers. The QAPM's responsibilities include:

- Providing guidance and consultation for implementing QA Program requirements.

- Directing the QA activities of the EM Department and the development and maintenance of the EM Department QA Program.

- Reviewing procurement documents to ensure applicable QA Program elements have been passed on to suppliers and subcontractors.

- Reviewing and oversight of the QA Project Plan, QAAs, QA/QC requirements of SOPs and SOPAs, instructions, and test plans with respect to quality assurance.

- Assuring EM Department QA Records system.

- Providing training in the requirements of this QAPjP and related topics, such as quality assurance goals, methods and practice.

- Assuring that required contractor/vendor surveillances and compliance audits are performed.

- Verifying that inspections and tests are performed as required and that inspection/test personnel are properly qualified/certified.

- Assuring that Measuring and Test Equipment (M&TE) used in ER quality-affecting activities is controlled and calibrated.

- Verifying that necessary audits and surveillances of sample handling, storage, and shipping are performed.

- Developing quality verification activity schedules.

- Selecting, training, and certifying audit personnel and other quality verification personnel.

- Reporting the results of quality verification activities, such as audits, to the EM Department Director, and the division managers as appropriate.

- Assigning Nonconformance Reports (NCRs) to responsible EM Department division managers for disposition.

- Concurring with NCR dispositions, and maintaining a system for tracking and trending NCRs.

- Monitoring corrective action documentation for conditions adverse to quality, verifying implementation of corrective actions, tracking and trending corrective action status, and closure of corrective action documentation upon completion of corrective action.

- Preparing and issuing, on a monthly basis, an Information and Tracking Report of QA Program activities.

- Performing periodic management assessment of QA program implementation and effectiveness.

2.3 Environmental Management Department Division Managers

The RPD is responsible for planning, implementing, and managing the ER Program at RFP, including RCRA and CERCLA projects performed under the IAG. The ER Program is designed to investigate and remediate contaminated sites. The Division is responsible for

remedial investigations, RCRA facility investigations, feasibility studies/corrective measures studies, RCRA closures, remedial design and remedial/corrective actions.

EMAD has the overall responsibility to collect and assess environmental data and to provide technical support for the other divisions within ER. EMAD is responsible for the sampling of all environmental media at RFP, including air emissions sampling, soils sampling, surface water, and ground water. As such, EMAD is responsible for the development and implementation of all field procedures related to sample collection. This includes sampling methodology, sample handling, chain-of-custody, and sample tracking. Chemical and physical analyses of environmental samples are conducted under the oversight of EMAD. This includes laboratory contracting, setting laboratory QA/QC requirements, and auditing.

In general, these EM Department Division Managers are responsible for achieving quality work and data. The Division Managers', or designee's responsibilities include:

- Assignment and supervision of Group and Program Managers.
- Directing that personnel are qualified and trained.
- Designating a Technical Point-of-Contact (POC) for major procurement and subcontract activities.
- Approving procedures, instructions, plans, and their revision at the Division level.
- Assigning a Quality Assurance Coordinator (QAC) for the Division.
- Establishing controls on analytical and monitoring processes to assure processes are maintained within acceptable limits and that valid data quality levels are maintained.

- Directing the development and approval of test plans, overviewing testing activities, and ensuring that test results are properly documented.

- Directing that M&TE used in the collection of data are properly calibrated and that measurements performed with M&TE that was out of calibration are reported to the QAPM.

- Providing input into quality verification schedules.

- Assigning personnel to assist the QAPM to evaluate root causes for nonconformances, performing technical support, and recommending dispositions.

- Concurring with the dispositions and corrective actions identified in NCRs and assuring that nonconforming conditions are immediately addressed.

- Directing that personnel generate, process, validate, maintain, classify, and disposition QA Records in accordance with the requirements of this QAPjP.

- Directing that the retention period of their QA records are identified.

- Directing the implementation of software development requirements.

- Providing input to the EM Department Director's annual appraisal of QA Program effectiveness.

2.4 Procurement Department

Procurement Department responsibilities include:

- Processing purchase requisitions/contracts to meet EG&G standards, policies, and practices.

- Assuring that changes are not made to the technical or QA requirements without written consent from the EM Department Division Managers, or delegates, and QAC.

2.5 Records Management Manager

The Records Management Manager's responsibilities include:

- Developing and maintaining a records management system.

2.6 Document Control Manager

The Document Control Manager's responsibilities include:

- Developing and maintaining a document control system.

- Issuing the controlled documents to recipients identified on distribution lists.

- Assuring that revised documents are identified according to their revision status, superseded, or destroyed.

2.7 Technical Point-of-Contact

The designated procurement/subcontract Technical POC is responsible for:

- Acting as the EG&G technical liaison with the supplier or subcontractor.

- Initiating acceptance of items or services to assure that they meet procurement document requirements or that appropriate nonconformances are documented and corrective actions are taken.

2.8 Environmental Management Department and Division Personnel

EM Department personnel responsibilities include:

- Acting as OU-specific and Program-specific project managers, as assigned by Division Managers.

- Implementing operational procedures for their assigned tasks and the requirements in this QAPjP.

- Reporting promptly any nonconforming conditions adverse to quality to line management.

- Supporting, as assigned by division managers, the QAPM in root cause evaluation for nonconformances, performing technical evaluations, and recommending dispositions for nonconformances.

2.9 Quality Assurance Coordinators

QACs are responsible for coordinating QA Program activities within their EM Department Divisions, providing technical support in quality affecting activities, maintaining and inventory of division SOPs and quality assurance documents and the following:

- Providing guidance to other personnel in meeting QA Program requirements.

- Assuring that quality records are forwarded to the records management center.

- Assuring that QAPjPs, QAAs, procedures, instructions and test plans specific to the division are developed, approved, and implemented.

- Performing surveillances of the current work being conducted within their division.

- Coordinating, as necessary, division staff to perform independent technical and administrative reviews of QA plans, procedures, and instructions.

- Reviewing procurement document packages generated within their respective divisions to verify that QA requirements have been incorporated.

- Verifying that any special QA requirements specified in procurement packages are met, including performing verification activities at vendor facilities as necessary.

- Verifying and assuring that nonconformances are identified and segregated, and tracking and monitoring the status of open NCRs that have been assigned to their respective divisions.

- Maintaining direct communication and liaison with the EM Department QAPM working at the direction of, and in support of, the division manager.

TITLE: QUALITY ASSURANCE PROGRAM

Approved By:

5/2/91
Director, Environmental Management

TABLE OF CONTENTS

1.0 QA PROJECT PLAN BASIS

The requirements for developing this site-wide QAPjP are established in the IAG and DOE Orders 5700.6B, Quality Assurance and 5400.1, General Environmental Protection Program. The IAG requires a quality assurance project plan to be developed based on the EPA guidance for preparing QA project plans contained in EPA/QAMS/005/80, Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans. Precedence for a site-wide QAPjP is established in the NCP. DOE Order 5400.1 establishes environmental protection program requirements for DOE operations. It requires a quality assurance program to be established for environmental programs that is consistent with DOE Order 5700.6B. DOE Order 5700.6B sets forth requirements for establishing, implementing, and maintaining plans and actions to assure quality achievement in DOE Programs. DOE

5700.6B requires the quality assurance elements of the American Society of Mechanical Engineers NQA-1, Quality Assurance Program Requirements for Nuclear Facilities, to be addressed in DOE quality assurance plans.

Since this QAPjP is a DOE QA plan, its format is based on the 18 criteria addressed by NQA-1. The 16 QA elements of EPA/QAMS/005/80 are accommodated within those sections. A matrix identifying where the 16 elements of EPA/QAMS/005/80 are addressed in the QAPjP is shown in Figure 2-1. The relationship of the QA requirements documents, guidance documents, site-wide and OU-specific planning documents, and sampling plans (discussed later in Section 2.3) are shown in Figure 2-2.

This QAPjP describes the QA requirements which will be implemented by the DOE, the Rocky Flats operating contractor, EG&G Rocky Flats, Inc., and all subcontractors conducting environmental response activities at the RFP. EG&G will provide overall management of the response effort, including subcontracted elements and subcontractors. In general, environmental response activities are based on groupings of the RFP hazardous waste sites which are identified as OUs made up of groupings of individual SWMUs.

2.0 QA PROJECT PLAN FORMAT

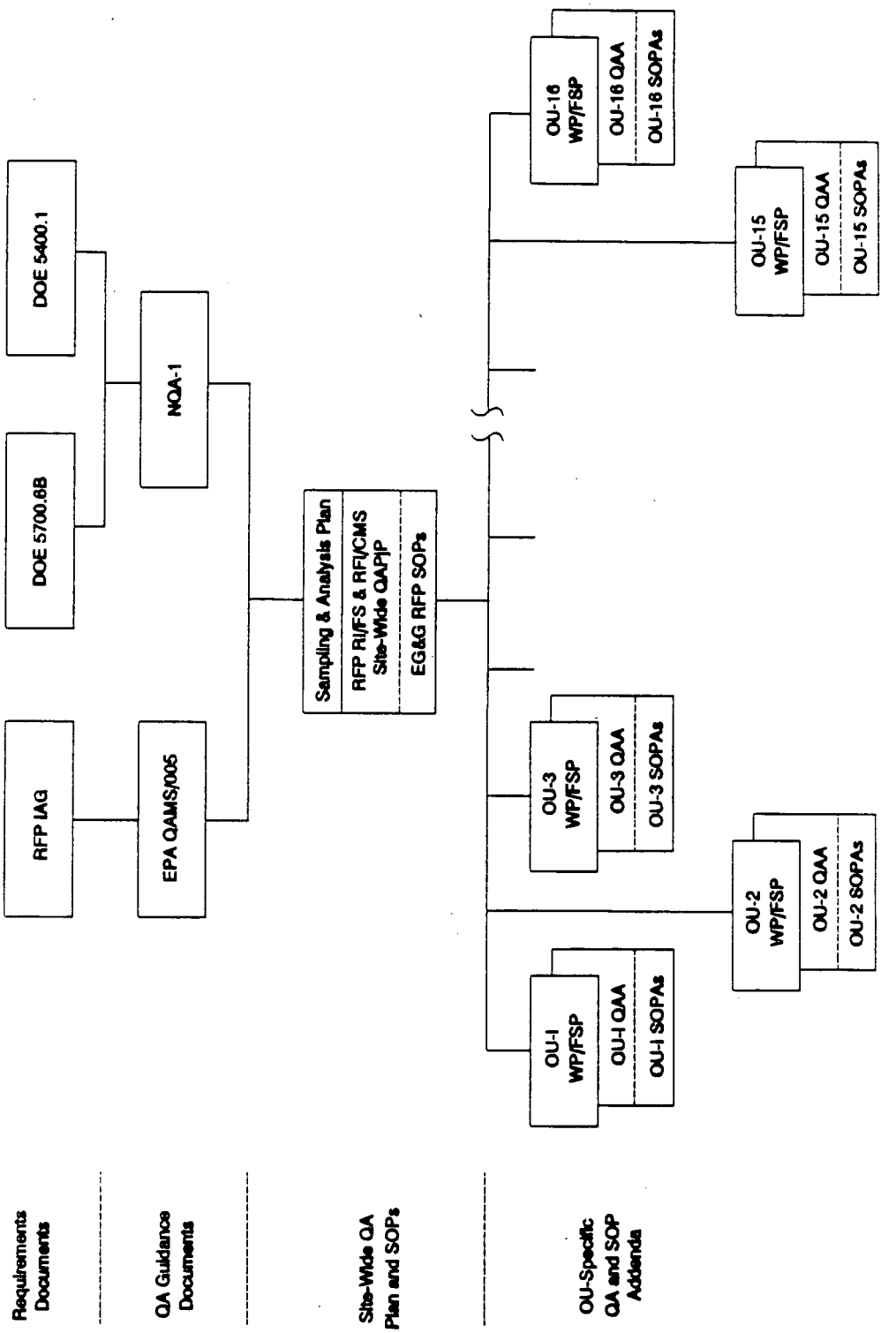
With the exception of Sections 1 and 2, this QAPjP is formatted using the following method. Each section contains a discussion of the section's purpose, applicability, requirements, and QA records required to be maintained as a result of implementing the requirements.

Figure 2-1

LOCATION OF QAMS-005/80 ELEMENTS WITHIN THE RI/FS QAPjP

EPA QAMS-005/80 ELEMENT		QAPjP SECTION
(1)	Title Page with Approvals	Title and Approvals
(2)	Table of Contents	T of C
(3)	Project Description	Introduction and Scope
(4)	Project Organization and Responsibility	1.0
(5)	Data Quality Objectives (DQOs)	3.0 and App. A
(6)	Sampling Procedures	3.0, 5.O, and 8.0
(7)	Sampling Custody	8.0
(8)	Calibration Procedures and Frequency	12.0
(9)	Analytical Procedures	3.0
(10)	Data Reduction, Validation, and Reporting	3.0
(11)	Internal Quality Control Checks and Frequency	3.0
(12)	Performance and System Audits and Frequency	18.0
(13)	Preventive Maintenance Procedures and Schedules	12.0
(14)	Specific Routine Procedures to Assess Data Quality	3.0 and App. A
(15)	Corrective Action	16.0
(16)	Quality Assurance Reports to Management	2.0

Figure 2-2
QA Requirements and QA Document/Sampling Plan Hierarchy for RFP ER Program



3.0 QAPjP RELATIONSHIP TO WORK PLAN/FIELD SAMPLING PLAN

The RFP Federal Facility Agreement Statement of Work (Attachment 2 of the IAG) requires that a Sampling and Analysis Plan (SAP) be developed, approved, and implemented for the investigation and study phases of the RFP ER program. The SAP for the RFP consists of two parts: (1) this QAPjP, and (2) SOPs for Rocky Flats Plant. This QAPjP describes the policy, organization, functional responsibilities, and quality assurance requirements and methods necessary to assure that the quality of data meets the objectives dictated by its intended use. The SOPs (which are also referred to herein as EG&G Rocky Flats SOPs) detail the field techniques to be utilized during the investigation of the RFP, and provide guidance for the performance of all field work. The SOPs, which together with this QAPjP form the SAP, are listed in the matrix of Table 2-1. The field activity for which each SOP is applicable is designated by the matrix.

In addition to the RFP site-wide SAP, the EM Department and its subcontractors will prepare OU-specific Work Plan/Field Sampling Plans (WPs), which describe how each OU will be characterized and include specific OU background information, sampling objectives, sample location, and minimum frequency for each task and/or operation.

Each WP will be accompanied by a QAA, prepared under the direction of the EM Department, which will outline those site- or OU-specific measures taken to meet the QA requirements in this QAPjP. The QAA will reference the SOPs applicable to each OU. Where necessary, SOPAs will be developed and submitted along with the WP and QAA in order to incorporate desired variations into standard SOPs that are specific to a particular OU. The relationship of SOPs, WPs, QAAs, and SOPAs to this QAPjP is shown in Figure 2-2.

TABLE 2.1.
Standard Operating Procedures and Field Activities for Which They are Applicable

Former SOP Reference Number	New SOP Reference Number	Standard Operating Procedures	Well Drilling, Completion, Development	Ground-Water Sampling	Surface-Water Sampling	Sediment Sampling	Surface Soil Sampling	Subsurface Soil/Mat. Sampling	Hydrologic Testing	Source Sampling	Biota Sampling
1.1	GEN.17	Wind Blown Contaminant Dispersion Control	●					●			
1.2	GEN.12	Field Document Control		●	●	●	●		●	●	●
1.3	GEN.09	General Equipment Decontamination	●	●	●	●	●	●	●	●	●
1.4	GEN.10	Heavy Equipment Decontamination	●	●	●	●	●	●	●	●	●
1.5	GEN.04	Handling of Purge and Development Water	●	●					●		
1.6	GEN.05	Handling of Personal Protective Equipment	●	●	●	●	●	●	●	●	●
1.7	GEN.11	Handling of Decontamination Water & Wash Water	●	●	●	●	●	●	●	●	●
1.8	GEN.06	Handling of Drilling Fluids & Cuttings	●			●		●			
1.9	GEN.07	Handling of Residual Samples					●	●		●	●
1.10	GEN.01	Receiving, Labeling, and Handling Waste Containers	●	●				●	●	●	●
1.11	GEN.14	Field Communications	●	●	●	●	●	●	●	●	●
1.12	GEN.18	Decontamination Facility Operations	●	●	●	●	●	●	●	●	●
1.13	GEN.02	Containerizing, Preserving, Handling, and Shipping of Soil and Water Samples		●	●	●	●	●	●	●	●
1.14	GEN.15	Field Data Management	●	●	●	●	●	●	●	●	●
1.15	GEN.03	Use of PIDs and FIDs	X	X	X	X	X	X	X	X	X
1.16	GEN.08	Field Radiological Measurements a) Walk-Over Surveys	X	X	X	X	X	X	X	X	X
		b) Sample and Waste Screening	X	X	X	X	X	X	X	X	X
New	GEN.19	Surveying and Mapping of Sampling Points	●	●	●		●	●		●	
2.1	GW.01	Water Level Measurements in Wells and Piezometers	●	●					●		
2.2	GW.02	Well Development a) New Wells	●								
		b) Redevelopment	●								
2.3	GW.03	Pump-in Borehole Packer Testing	●						●		
2.4	GW.06	Slug Tests	●	●							
2.5	GW.04	Measurements for Groundwater Field Parameters		●					●		

X - As required by H&S plan.

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TABLE 2-1. (Continued)
Standard Operating Procedures and Field Activities for Which They are Applicable

Former SOP Reference Number	New SOP Reference Number	Standard Operating Procedures	Well Drilling, Completion, Development	Ground-Water Sampling	Surface-Water Sampling	Sediment Sampling	Surface Soil Sampling	Subsurface Soil Sampling	Hydrologic Testing	Source Sampling	Blank Samples
2.6	GW.05	Groundwater Sampling a) Bailer		●							
		b) Pump		●							
3.1	GT.09	Logging Alluvial and Bedrock Material	●					●			
3.2	GT.01	Drilling and Sampling Using Hollow-Stem Auger Techniques									
		a) Drilling	●					●			
		b) Continous Auger Coring	●					●			
		c) Drive Samples	●					●			
3.3	GT.02	Isolating Bedrock from the Alluvium with Grouted Surface Casing	●								
3.4	GT.03	Rotary Drilling and Rock Coring									
		a) Air	●								
		b) Water	●								
3.5	GT.04	Plugging and Abandonment of Boreholes	●					●			
3.6	GT.05	Monitoring Well and Piezometer Installation	●								
3.7	GT.06	Logging and Sampling of Test Pits and Trenches					●	●			
3.8	GT.07	Surface Soil Sampling					●				
3.9	GT.11	Soil Gas Sampling and Field Analysis									
3.10	GT.10	Borehole Clearing						●			
3.11	GT.12	Plugging and Abandonment of Wells	●								
New	GT.13	Downhole Geophysical Surveys	●	●					●		
New	GT.14	Surface Geophysical Surveys	●	●						●	
4.1	SW.01	Surface Water Data Collection Activities			●						
4.2	SW.02	Field Measurement of Surface Water Parameters			●						
4.3	SW.03	Surface Water Sampling			●						
4.4	SW.04	Discharge Measurements			●						

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TABLE 2.1. (Continued)
Standard Operating Procedures and Field Activities for Which They are Applicable

Former SOP Reference Number	New SOP Reference Number	Standard Operating Procedures	Well Drilling, Completion, Development	Ground-Water Sampling	Surface-Water Sampling	Sediment Sampling	Surface Soil Sampling	Subsurface Soil Sampling	Hydrologic Testing	Source Sampling	Biota Sampling
4.5	SW.05	Base Laboratory Work	●	●	●	●	●	●	●	●	●
4.6	SW.06	Sediment Sampling				●					
4.7	SW.07	Collection of Tap Water Samples		●							
4.8	SW.08	Pond Sampling			●						
4.9	SW.09	Industrial Effluent and Pond Discharge Sampling			●						
5.1	EE.01	Sampling of Periphyton									●
5.2	EE.02	Sampling of Benthic Macroinvertebrates									●
5.3	EE.03	Sampling of Plankton									●
5.4	EE.04	Sampling of Fishes									●
5.5	EE.05	Sampling of Large Mammals									●
5.6	EE.06	Sampling of Small Mammals									●
5.7	EE.07	Sampling of Birds									●
5.8	EE.08	Sampling of Reptiles and Amphibians									●
5.9	EE.09	Sampling of Terrestrial Arthropods									●
5.10	EE.10	Sampling of Terrestrial Vegetation									●
6.12	MT.15	Preventive Maintenance Procedure for RFP TSP HiVOL Air Sampler									
New	MT.16	Placement, Design, Installation, and Operation of Meteorological Measuring Stations									
New	MT.17	Placement, Design, Installation, and Operation of Particulate and Air Toxics Monitoring Stations									
New	MT.18	Instrument Maintenance and Calibration of Meteorological Monitoring Equipment									
New	MT.19	Site-Specific Particulate and Air Toxic Monitoring at Active Investigation Site									

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4.0 TRAINING, QUALIFICATION, AND CERTIFICATION

Personnel involved in activities affecting quality shall receive appropriate training and orientation from qualified personnel to assure proper understanding of the requirements of this QAPjP and supporting procedures prior to initiation of quality-affecting activities. Specialized training and orientation shall be provided to assure that personnel, including quality verification and inspection personnel, achieve and maintain suitable proficiency in the activities they perform.

The EM Department Division Managers shall determine training needs. They shall also review and approve assignments. Completion of training activities shall be documented. The QAPM shall assure that appropriate training is provided.

Training may be provided in the form of required reading, formal classroom sessions, on-the-job training, or other methods. Division Managers shall assure that assigned staff receive complete training commensurate with the scope and complexity of their assigned tasks.

4.1 Personnel Training

Project personnel shall be trained in their areas of responsibility. With respect to QA activities and procedures, key project personnel shall be provided an orientation session on the QA requirements contained in the QAPjP. Attendance at the orientation shall be documented using an Orientation Attendance Sheet, Figure 2-3.

EM Department and subcontractor personnel conducting ER field activities are also required to complete the Occupational Safety and Health Administration (OSHA) 40-hour Hazardous Waste Site Worker Safety Training and the annual OSHA 8-hour Hazardous Waste Site

Figure 2-3

TRAINING ATTENDANCE SHEET

DATE: _____

PROJECT/ACTIVITY: _____

_____

ATTENDEES

PRINTED NAME	SIGNATURE	EMPLOYEE NUMBER

INSTRUCTOR: _____ _____ _____

print name signature date

Worker Safety Refresher course (required by 29 CFR 1910.120). In addition, personnel directly supervising hazardous waste site workers are required to complete the OSHA 8-hour Hazardous Waste Site Supervisor Safety course.

Site safety training, consistent with the requirements found in the Site Health and Safety Plan, shall also be conducted. Project participants who perform activities for this project shall be trained in the applicable safety procedures.

4.2 Qualification and Certification of Personnel

The QAPM shall direct the implementation of a personnel qualification system. Division Managers are responsible for assuring that personnel performing quality-affecting activities are properly qualified and certified, as necessary, as identified in job descriptions.

The QAPM shall assure that the education and experience required for these positions have been met.

4.3 Proficiency Evaluation

The QAPM shall assure that the job proficiency of personnel performing quality-affecting activities is monitored, and documented at least annually, according to an established personnel qualification system.

5.0 SUBCONTRACTOR/VENDOR QA PROGRAM

Applicable elements of the QA Program described in this QAPjP and supporting procedures shall be passed on to subtier organizations, such as subcontractors and vendors, through procurement and contracting documents.

6.0 QUALITY ASSURANCE REPORTS TO MANAGEMENT

The EM Department Director, Division Managers, and the QAPM shall rely on written reports documenting project progress and status, with respect to quality data assessment activities, system and performance audits, nonconformance reports, corrective action reports, and technical memoranda, to ensure overall adherence of the project to QA requirements. The responsibilities for the preparation and frequency of these reports are discussed in subsequent sections of this QAPjP. In addition to these specific QA issue reports, the following programmatic reports will be prepared to track the status of the QA Program implementation and to assess the effectiveness of the overall program.

The QAPM shall prepare and issue a monthly QA Program information tracking and evaluation report. The report will contain:

- Status of QA Program implementation.
- Status of resolution of conditions adverse to quality (NCRs) and trends.
- Summary of QA Program management overview results (from audits and inspections), including both adverse conditions and exemplary practices.

The QAPM will provide guidance to the Division Managers and their staff, as required, in the review of QA reports, including NCRs, audit findings, and surveillance/inspection reports, prepared by the Division QACs or subcontractor QA staff, and will provide recommendations to the EM Department Director and Division Managers concerning any corrective actions that need to be taken. The QAPM shall verify preparation of Corrective Action Reports resulting from surveillance activities, audits, progress reports, or documentation of any problems requiring corrective action. The QAPM may generate some of these reports or direct Division QACs or QA subcontractors in preparing them. Data

Assessment Summary reports, which address the accuracy, precision, and completeness of data, are prepared by data validation subcontractors and submitted to EG&G, as discussed in Section 3. Quality verification activities (e.g., audits) shall be conducted according to the frequency requirements established in Section 18 of this QAPjP. EG&G Rocky Flats personnel and subcontractor personnel shall initiate NCRs whenever a nonconforming activity, item, service, data, material, or condition is detected, as described in Section 15.

A management appraisal shall be conducted by the EM Department Director to annually to assess the adequacy and effectiveness of the QA Program, and shall include an evaluation of the following program aspects:

- Adequacy of planning and procedural controls.
- Effectiveness of the corrective action system.
- Adequacy of organizational structure and staffing to implement the QA program.
- Adequacy of the indoctrination and training program.
- Adequacy of the QA information tracking and evaluation reporting system.

These QA reports shall be maintained in the QA records management system.

TITLE: DESIGN CONTROL AND CONTROL OF SCIENTIFIC INVESTIGATIONS

Approved By:

5/2/91
Director, Environmental Management

TABLE OF CONTENTS

1.0 PURPOSE

This section describes the requirements and methods by which ER scientific investigations, analyses, and report preparation are controlled and verified by the EM Department Divisions.

These controls include requirements for the establishment of data quality objectives; sampling procedures; data reduction, validation, and reporting; internal quality control checks; data assessment; data validation criteria; peer review; and design records.

2.0 APPLICABILITY

These requirements are applicable primarily to scientific investigations, which include field sampling, sample and data handling, and analysis and interpretation, as required under the IAG and referenced guidance documents. This section is applicable to personnel performing work activities that affect the data quality required for those activities.

Designed, engineered, or constructed plant facilities, which are specifically related to environmental restoration of plant areas, OUs, SWMUs, or RCRA Closure Units are not addressed in the requirements of this QAPjP. Design control methods for these facilities are currently addressed in the RFP Facilities Engineering and Project Management Manual, used to satisfy DOE Order 6430.1A.

3.0 REQUIREMENTS

3.1 Data Quality Objectives

Data quality objectives (DQOs) quantitatively and qualitatively describe the uncertainty that a decision maker is willing to accept in results derived from environmental data. This uncertainty is used to specify the quality of the measurement data required, usually in terms

of precision, accuracy, representativeness, comparability, and completeness (PARCC) parameters. The establishment of DQOs assists in all aspects of investigations, including determining methods for sampling, sample preparation, and selection of appropriate analytical methods.

The process for establishing project/site specific DQOs is described in EPA/540/G-87/003, "Data Quality Objectives for Remedial Response Activities - Development Process," and is outlined in Appendix A. An example DQO development scenario for RI/FS activities at a site with contaminated soils and groundwater is presented in EPA/540/G-87/004, "Data Quality Objectives for Remedial Response Activities - Example Scenarios."

DQOs must be established prior to the initiation of field or laboratory work using the process described in Appendix A. The project/site specific data users, use(s) of data, data objectives, sampling methods, and appropriate analytical levels will be established in individual workplans. The project/site specific analytical methods and PARCC parameters will be summarized in the QAAs that are developed for each workplan. The field DQOs will also be documented in the WP and summarized in the QAA. These DQOs include field instrument precision and accuracy as well as objectives for field QC measures such as acceptable variance in field duplicate, trip and rinsate samples and other specific field tests. DQOs for field instruments are specified in the specific SOPs and are also summarized in Appendix B. The General Radiochemistry and Routine Analytical Services Protocol (GRRASP) is the scope of work pertaining to analytical chemistry services for the RFP RI/FS and RFI/CMS efforts. Technical requirements in the GRRASP specify the methods to be used, required detection limits, and the deliverables necessary.

3.2 Sampling Procedures

The SOPs, which together with this QAPjP comprise the SAP for the RFP ER Program, outline specific sampling procedures for ER activities. The SOPs and the field activities to

which they apply are listed in Table 2-1. Field sampling procedures for groundwater are described in SOP 2.6, Groundwater Sampling. The procedures for measuring groundwater parameters in the field are discussed in SOP 2.5, Measurements for Groundwater Field Parameters. Groundwater monitoring (i.e., water level measurements) procedures are described in SOP 2.1, Water Level Measurements in Wells and Piezometers and SOP 2.2, Well Development. Surface water sampling procedures are described in SOPs 4.1, Surface Water Data Collection Activities; 4.3, Surface Water Sampling; 4.7, Collection of Tap Water Sampling; and 4.8, Pond Sampling. Procedures for measuring surface water parameters in the field are described in SOPs 4.2, Field Measurement of Surface Water Parameters and 4.4, Discharge Measurements. Procedures for sediment sampling are described in SOP 4.6. Field sampling procedures for subsurface soils and bedrock are described in SOPs 3.2, Drilling and Sampling Using Hollow-Stem Auger Techniques; 3.4, Rotary Drilling and Rock Coring; and 3.7, Logging of Test Pits and Trenches. The procedures for providing field descriptions of subsurface soils and bedrock are described in SOPs 3.1, Logging Alluvial and Bedrock Materials and 3.7, Logging of Test Pits and Trenches. Field sampling procedures for surface soil sampling are described in SOP 3.8, Surface Soil Sampling. SOP 3.9, Soil Gas Sampling and Field Analysis, describes the field procedures for obtaining VOC samples when sampling soils. Field procedures for terrestrial and aquatic biota sampling are described in the Biota Sampling SOPs listed in Table 2-1.

The procedures for sample preparation in the field, sample preservation, sample handling and shipment of samples are described in SOP 1.13, Containerizing, Preserving, Handling, and Shipping of Soil and Water Samples. The procedures for obtaining radiological measurements prior to and during field sampling are described in SOP 1.16, Field Radiological Measurements.

The workplans for each OU and treatability study will be reviewed and approved by EG&G Rocky Flats and the DOE. As part of this review and approval process, the Field Sampling Plan portion of the workplan will be reviewed to ensure that the proposed field sampling

activities are planned to be conducted according to the SOPs described in the SAP. Where site or activity specific variations to SOPs are needed to effectively conduct sampling, SOPAs will be utilized. Site or activity specific SOPAs will be incorporated into the workplans. The SOPs and SOPAs that will be used to implement the site or activity specific field sampling plan will be referenced in the workplans and QAAs.

Site or activity specific SOPs and SOPAs will be incorporated into the WPs/QAAs for appropriate approvals. New procedures, if needed, may be submitted and/or recommended in the WPs on an individual basis. All requests for new or revised SOPs must be submitted to the RPD Manager and other appropriate Division Managers as specified in Section 5.0. The RPD Division Manager, or his designee, shall obtain the required approvals, including EPA/CDH approval, prior to use.

In order to assure that approved sampling procedures are being adhered to during field sampling activities, quality verification field surveillances will be conducted as described in Section 18, Quality Verification. The QAPM will develop a surveillance schedule based on the field activity schedule presented in the workplans. The specific tasks and frequency of field surveillances shall be specified in the QAAs that accompany each workplan. Examples of tasks and frequency of surveillances to be addressed in QAAs would be: approximately 10 percent of the boreholes and well installations at each OU; and approximately 5 percent of the samples for each type of sample collected.

3.3 Analytical Procedures

Laboratory analytical requirements for the RFP ER Program are specified in the GRRASP, which is the scope of work for analytical services for the RFP ER program. These requirements are generally consistent with those specified in SOWs used in the U.S. EPA's Contract Laboratory Program (CLP). These SOWs are used for analysis of parameters where CLP methods are available. The following SOWs apply:

1. *USEPA-CLP, Statement of Work for Organics Analysis, Multi-Media, Multi-Concentration*, 10/86 (Rev. 1/87, 2/87, 7/87, 8/87, 2/88).

2. *USEPA-CLP, Statement of Work for Inorganics Analysis, Multi-Media, Multi-Concentration*, 7/87.

The subcontractor may not deviate from these SOW requirements except as specified in the GRRASP or with written consent of EG&G.

For analyses where CLP methods are not available, such as water quality parameters (chlorides, nitrates, sulfates, alkalinity, TDS, etc.) and radiochemistry (gross alpha/beta, $Pu^{239,240}$, $U^{233,234,235,238}$, tritium, $Sr^{89,90}$, Cs^{137}, etc.), the following methods apply:

1. USEPA, *Test Methods for Evaluating Solid Waste*, SW-846, 3rd Edition.

2. USEPA, *Radiochemical Analytical Procedures for Analysis of Environmental Samples*, No. EMSL-LV-0539-17, Las Vegas, Nevada, 1979.

3. USEPA, *Interim Radiochemical Methodology for Drinking Water*, No. EPA-600/4-75-008, Cincinnati, Ohio, 1976.

4. USEPA, *Prescribed Procedures for Measurement of Radioactivity in Drinking Water*, No. EPA-600/4-80-032, Cincinnati, Ohio, 1980.

5. American Public Health Association (APHA), *Standard Methods for the Examination of Water and Wastewater*, 17th Edition, New York, New York, 1989.

6. USEPA, *Eastern Environmental Radiation Facility Radiochemistry Procedures Manual*, No. 520/5-84-006, 1984.

7. USEPA, *Methods for Chemical Analysis of Water and Wastes*, No. 625/6-74-003 (or latest revision).

8. USEPA, *Procedures for Radiochemical Analysis of Nuclear Reactor Aqueous Solutions*, No. R4-73-014, 1973.

9. HASL, *EML Procedures Manual*, No. HASL-300 (latest revision).

10. NRC Regulatory Guides.

The methods for particular analyses must be used such that the required detection limits (or minimum detectable activity) that are specified in the GRRASP are achieved. Standard methods may be modified or alternative methods substituted only with the written consent of EG&G.

Sample analyses must be conducted using standard methods and shall meet the requirements specified in the GRRASP. Analyses shall be conducted under a documented QA/QC program. As a requirement of the GRRASP, each laboratory contractor conducting analysis of ER program samples will develop SOPs and submit to EG&G's internal laboratory. These SOPs must be specific to the laboratory and be adapted, as necessary, to analysis of ER program samples. The SOPs will adhere to standard, accepted QA/QC procedures that are applicable to the analytical method and applicable to Good Laboratory Practice Standards (40 CFR 792). The internal laboratory SOPs shall cover the following areas in sufficient detail and shall reflect actual operating conditions in effect during sample analysis:

- Sample receipt and log-in
- Sample storage and security
- Facility security
- Sample tracking (from receipt to sample disposition)

- Sample analysis method references
- Data reduction, verification, and reporting
- Document control
- Data package assembly
- Qualifications of personnel and resumes
- Preparation of standards
- Equipment maintenance and calibration
- List of instrumentation and equipment (include date purchased, date installed, model number, manufacturer, and service contracts, if any)
- Instrument detection limits
- Acceptance criteria for non-CLP analyses

Requiring all laboratories to conform to the requirements of the scope of work for ER program analytical services and develop SOPs for EG&G review and approval will assure a consistent analytical QA/QC program. To ensure that laboratories are adhering to the requirements of the GRRASP and laboratory SOPs, EG&G shall conduct on-site audits of the laboratory facilities.

The analytical detection limits that are specified in the GRRASP and the DQOs for RFP analyses conducted under the CLP protocols are shown in Appendix B. The DQO development process is detailed in Appendix A. This process must be followed in the development of ER WPs. The QAA for each of these plans will summarize the DQOs for each WP and will specify the analytical detection limits and requirements needed to support the DQOs. In most cases, the CLP detection limits and DQOs illustrated in Appendix B will apply; however, some WPs may require lower detection limits for critical measurements or less stringent methodology for less sensitive measurements (i.e., field screening, reconnaissance measurements). In some cases, the WPs may require analysis of parameters not listed in Appendix B. In those cases, the QAAs will specify the detection limits and analytical methods.

3.4 Data Reduction, Validation, and Reporting

Analytical data results will be submitted to the EM Department EMAD. These data will include results from field surveys and laboratories. Analytical results shall be independently validated and the results will be submitted to the EMAD. EMAD will review DQOs specified in the WPs to determine if existing analytical and validation guidelines address validation needs. If validation guidelines do not address DQO needs, the existing guidelines will be revised or new guidelines will be developed. The percentage of sample delivery groups to be validated will be determined or required by the DQOs.

3.4.1 Data Reduction

Data reduction functions are divided into field and laboratory reduction activities. Each of these activities are summarized below.

Field Data Reduction

Field measurements, data, and observations shall be recorded in project log books, on field data forms, or on similar permanent records. Entries shall be recorded directly and legibly in indelible ink in field logbooks or on field forms with all entries signed and dated, or as specified in SOPs (note: for some field measurements, this may not be appropriate, [i.e., seismic logs, strip charts]; accepted standard methods specific to these activities will be used). If entries must be changed, the change shall not obscure the original entry. The reason for the change shall be stated and the correction and explanation shall be signed and dated or otherwise appropriately identified at the time the correction is made. Field data records will be organized into standard formats whenever possible and retained in the QA records system. Each of the EG&G SOPs listed in Table 2-1 shall specify the field data and sampling records that will be generated as a result of implementing the procedure. Generic

examples of the types of field operations and sampling records specified in the EG&G SOPs include but are not limited to:

- Field data sheets and field logs.
- Data processing and storage records.
- Sample identification and chain-of-custody (C-O-C) records.
- Document control, inventory, and filing records.
- QA/QC records.
- Health and safety records.

The combined data records should be sufficiently detailed to provide a complete and accurate history of data gathering and results.

Laboratory Data Reduction

Laboratory data shall be recorded or acquired during analysis and then prepared for review through computerized or manual algorithms to produce a raw data set (note: the GRRASP specifies the use of "flat" ASCII format). Raw data shall be verified in the laboratory through checking calculations, dilutions, and standard QC sample concentrations and comparing these to known or expected values in accordance with CLP protocol. Any errors or discrepancies discovered by EG&G staff shall be resolved through the use of "Nonconformance Procedures" referenced in Section 15 prior to generating final reports. Corrections to raw data and documentation shall be initialled and dated after making the changes. A second verification of laboratory data reduction will occur during data validation.

3.4.2 Validation

Validation activities consist of reviewing and verifying field and laboratory data and evaluating data quality. The field and laboratory validation activities are described below. Data validation includes the analytes listed in the RFP-SOW GRRASP and specific validation guidelines. The site specific DQOs that are used in the data validation process are listed in the site specific WP/QAAs, which are provided to the EMAD.

Field Data Validation

Validation of field technical data will be performed on two different levels. First, data shall be validated by periodic surveillances at the time of field collection by following ER SOPs for data validation. Secondly, data shall be validated by the EMAD or subcontractor who will review all collected data to ensure the correct codes and units have been used. After the data has been reduced, the field data validation subcontractor will review data sets for anomalous values. Any inconsistencies discovered shall be annotated by data validation personnel in the field log book to explain the anomalous values.

Replicates of field measurements will be taken periodically by the field sampling crews to ensure the validity of technical data from field instruments. Random checks of sampling and field conditions (e.g., weather, wind, temperature, etc.) shall be made by the field data validation subcontractor, the EM Department personnel, as well as other QA/QC personnel, who shall check recorded data to confirm observations. Whenever possible, in-house peer review will also be incorporated into the data validation process in order to maximize consistency among field personnel. EMAD or its subcontractors will validate field data prior to inclusion into the RFED database as specified in SOP 1.14, Data Base Management, and the DQOs established in the WP/QAAs.

Laboratory Data Validation

Laboratory data shall be reviewed and validated by the EMAD laboratory validation subcontractor. Results of data review and validation activities are documented in data validation reports. EPA-CLP data validation functional guidelines are used for validating organic and inorganic (metals) data. Functional guidelines for validating most radiochemistry and water quality parameter data have not been published by EPA; however, data validation functional guidelines, applied directly from EPA-CLP, have been established by the EG&G EM Department. The functional guidelines that will be used to validate analytical data are:

- U.S. EPA, Laboratory Data Validation Functional Guidelines for Evaluating Organics Analyses (2/88).

- U.S. EPA, Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses (7/88).

- EG&G Rocky Flats, Water Quality Parameter Data Validation Guidelines (9/89; Rev. 3/90).

- EG&G Rocky Flats, Radiochemical Data Validation Guidelines - Tritium Analyses by Liquid Scintillation (9/89; Rev. 5/90).

- EG&G Rocky Flats, Radiochemical Data Validation Guidelines - Isotopic Analyses by Gamma Spectrometry (Draft 1/91).

- EG&G Rocky Flats, Radiochemical Data Validation Guidelines - Gross Alpha/Beta by Gas Proportional Counters (9/89; Rev. 5/90).

- EG&G Rocky Flats, Radiochemical Data Validation Guidelines - Isotopic Analyses by Alpha Spectrometry (9/89, revised 5/90).

- Accepted standard or approved validation guidelines.

Analytical data generated for ER Program activities are assigned data usability qualifiers. Data usability qualifiers are assigned as a result of the data validation process and are consistent with EPA data usability qualifiers.

V Valid (usable for all purposes).
A Acceptable with qualifications (usable for most purposes).
R Rejected (unusable for most purposes).

All data generated in conjunction with IAG specified activities are subject to verification and validation, or as agreed to between DOE/CDH/EPA. Data review and validation criteria (e.g., holding times, instrument calibration requirements, detection limits, and QC sample analysis) are referenced in the GRRASP. Other data review and validation criteria will be specified in the WP/QAAs and supporting SOPs.

3.4.3 Reporting

Sample analysis reporting turnaround times are presented in Table 3-1. The reporting frequencies have been established for ER routine analyses. Reporting times for some analyses may be accelerated.

Table 3-1

Analytical Reporting Turnaround Times

CLP

(Calendar Days)

Analysis Package	Sample Data Diskette	Supporting Data Documentation
All except Radiochemistry:	45 days	50 days
Radiochemistry:	61 days	66 days

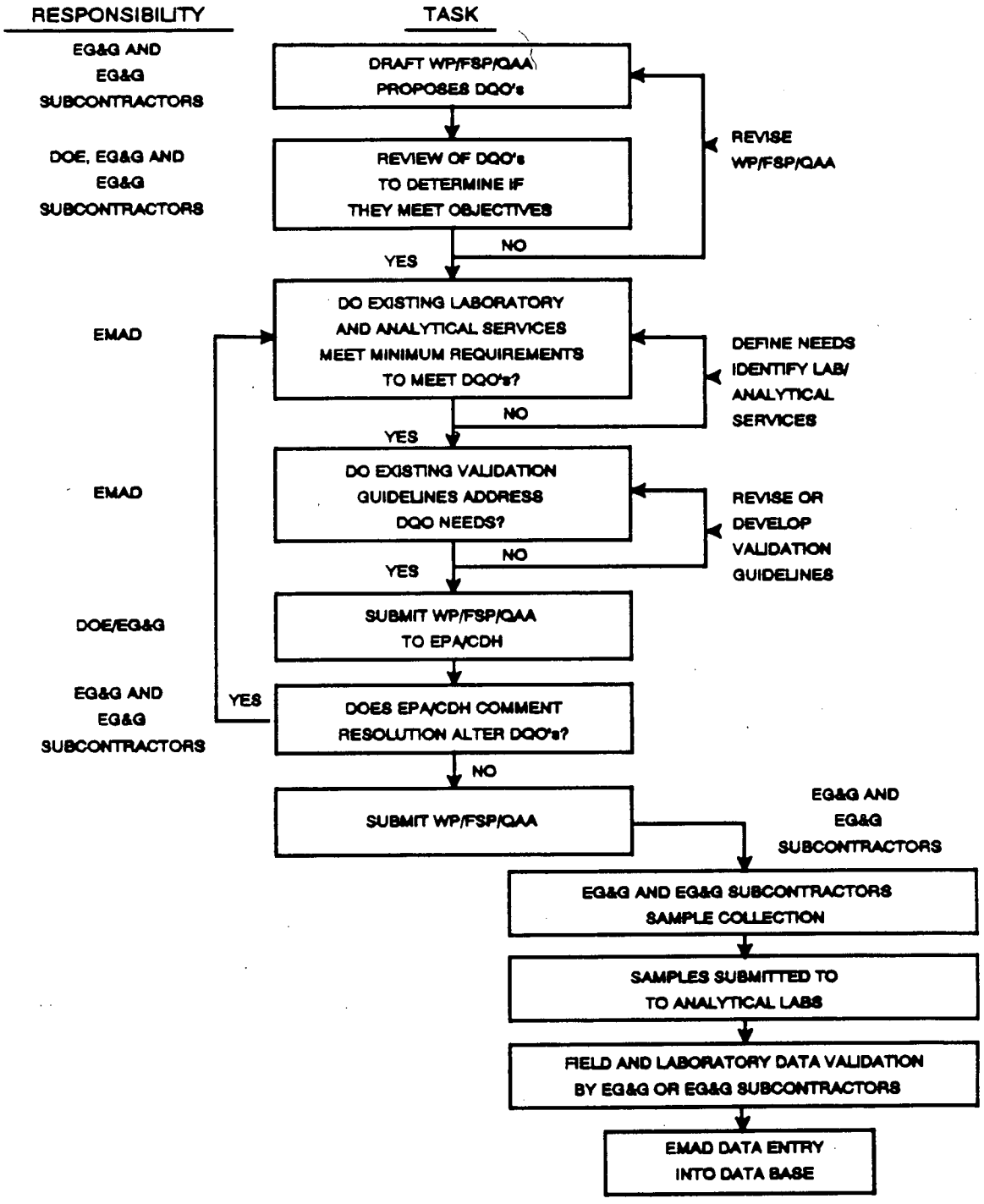
EMAD and the validation subcontractor receive analytical data packages that are prepared by the laboratories as soon as they are available. The validation subcontractor validates the data and submits the validated data to EMAD within 30 days. Figure 3-1 illustrates the validation process. Figure 3-1 also includes validation steps for both field and analytical activities.

The results of data validation are reported in EM Department Data Assessment Summary reports, which are prepared by EM Department subcontractors and submitted to the EMAD. These reports address the accuracy, precision, and completeness of field and laboratory data.

3.5 Internal Quality Control Checks

Standard QC procedures are employed in both the field and the laboratory to provide accurate, precise, consistent, and comparable results. In addition to the types of field QC samples described in the next section, each of the field sampling procedures listed previously in Table 2-1 (including SOP 2.6, SOP 3.8, SOP 4.3, SOP 4.6, SOP 4.7, SOP 4.8, and SOP

Figure 3-1
Validation Process



4.9) describe the field preparation procedures that shall be followed prior to taking the sample. Adherence to these procedures will assure consistency in sampling from one site to the next. SOP 1.13 describes the procedures for sample containerizing, preserving, handling, and shipping of field samples. In addition to SOP 1.13, each of the field sampling SOPs describes in detail the procedures for sampling, sample container preparation, and sampling preservation.

3.5.1 Field Sampling Quality Control Procedures

The field duplicate, the trip blanks, and the equipment rinsate blanks, where appropriate, will be sent with the samples from the field to the analytical laboratories. Other QC techniques may be employed with geotechnical or geophysical data where replicates or blanks are not practical. Table 3-2 shows general guidelines used for the collection frequency of QC samples outlined in the GRRASP. Procedures which describe duplicate, trip blank, and

Table 3-2

QC Sample Collection Frequency

Activity	Frequency
Field Duplicate	1 in 20
Field Blanks	As specified in the WP/QAA
Trip Blank	As specified in the WP/QAA
Equipment Rinsate Blank	1 in 20 or once per day, whichever is more frequent
Other QC Activities	As specified in the WP/QAA

equipment rinsate blank preparation for field sampling quality control are described in Section 5.0 of Standard Operating Procedures, Environmental Restoration Program, Rocky Flats Plant (1/89). The field duplicates and blanks will be used to provide measures of the internal consistency of the sampling procedures and storage practices. For analyses conducted under the GRRASP, QC samples that will be collected shall represent at a minimum one for every batch of 20 field samples. This proportion of QC samples will identify most potential sources of error. Applicability and need for QC samples for other samples (e.g., geologic, biological) will be addressed in DQOs in the WP/QAAs and SOPs.

3.5.1.1 *Field Duplicate*

Field duplicate samples are collected and analyzed to provide an indication of overall sampling and analytical precision. Field duplicates are collected following the same sampling procedures used to obtain the regular sample. In fact, a field duplicate is typically obtained when a sample from one location is split into two equal portions, with each portion going to the laboratory in a separate container. Exceptions to splitting samples to obtain a duplicate apply to duplicates for volatiles and for atmospheric and air quality (e.g., particulate) samples. Duplicate samples of volatiles will be collected independently to reduce the possibility of volatilization in the sample. For atmospheric and air quality samples, a field duplicate is obtained by a complete separate sample taken from a separate, colocated sampler and collected at the same time and/or over the same time period.

Field duplicates shall be obtained during groundwater sampling (SOP 2.6), surface water sampling (SOP 4.3), tap water sampling (SOP 4.7), pond sampling (SOP 4.8), sediment sampling (SOP 4.6), subsurface soil sampling (SOPs 3.2 and 3.7), surface soil sampling (SOP 3.8), and soil gas sampling (SOP 3.9), unless specified otherwise, with justification, in WP.

3.5.1.2 *Equipment Rinsate Blank*

Equipment blanks shall be prepared for manual and small automated sampling equipment used to collect samples. Equipment rinsate blanks shall be collected once per every 20 samples or once per day, whichever is more frequent. The procedure for collecting rinsate blanks consists of pouring volatile-free ASTM Type II reagent water into/through/over a decontaminated piece of sampling equipment (such as a bailer) and then dispensing it into prepared sample bottles. Sample bottles will be randomly selected from the supply of prepared sample bottles, selecting a sample container appropriate for each type of analysis for which environmental samples are being collected. Analyses of equipment rinsates are used to assess the efficiency of implementation of equipment decontamination SOPs. Unless specified otherwise in the WP, equipment rinsate blanks shall be obtained where sample collection requires the use of sampling equipment. The specific process for collecting rinsate blanks for the various types of sampling equipment to be used is described within each of the applicable field sampling SOPs. For example, the process for collecting rinsate blanks from groundwater sampling equipment is described in SOP 2.6, Groundwater Sampling, and the process for collecting rinsate blanks form subsurface soil samplers is described in SOP 3.2, Drilling and Sampling Using Hollow-Stem Auger Techniques.

3.5.1.3 *Field Blanks*

Field blanks consist of volatile-free ASTM Type II reagent water that are prepared in the field in the same manner as regular samples. The blanks serve to identify contamination that is potentially associated with sample collection, preparation, and transportation. Field blanks for groundwater and surface water sampling are prepared by carrying an unused, sealed bottle of volatile-free ASTM Type II reagent water into the field and preparing a sample bottle for the reagent water following the same preparation procedures that are applicable to a regular sample, including filtering and adding preservatives, as appropriate. The field blank sample is then transported to the lab for analysis with the regular samples. The field

blanks are then analyzed in the laboratory as if they were regular samples. The typical frequency for preparation of field blanks is once per every 20 samples. However, the need for field blanks and their frequency will be determined on a site or activity specific basis. Therefore, the use and frequency of field blanks will be specified in the WP/QAAs.

Field blanks for atmospheric data (e.g., new particulate filters) are taken to the field and handled, prepared, and transported for analysis (e.g., drying and weighing of filters) in the same manner as regular sample media. The blanks are not exposed to atmospheric conditions.

The use of field blanks for soil and sediment sampling at the RFP is not appropriate because of the lack of commercially available blank soils and solid materials that adequately reflect the various soil types encountered. Developing blank soil types within the RFP region is not practical due to the subjectivity of characterizing background soil conditions and the variability of soil types.

3.5.1.4 *Trip Blanks*

Trip blanks consist of volatile-free ASTM Type II reagent water samples that are prepared in the laboratory. Trip blanks serve to assess contamination of sample containers during storage and transport and of samples during preparation for analysis at the laboratory. Trip blanks for groundwater and surface water samples are prepared at the laboratory prior to the sampling trip by pouring volatile-free ASTM Type II reagent water into prepared (i.e., preservative added where appropriate) bottles. These sample bottles will be randomly selected from the supply of prepared sample bottles. The sample bottles will be filled with an appropriate amount of water for the analysis required. These trip blanks will be shipped to the sampling site with the regular sample bottles, and then transported back for analysis with the samples collected during the sampling event. The trip blanks will remain unopened throughout the sampling event. The trip blanks will be prepared and analyzed at the

laboratory as if they were regular samples. Trip blanks will be utilized in place of field blanks for volatile samples only, unless rinsate and/or field blanks indicate possible contamination; then trip blanks will be prepared for other analytes. As with field blanks, the frequency of trip blank use is typically once per every 20 samples. However, the need for and frequency of trip blanks will be determined on a site or activity specific basis. Therefore, the use of trip blanks and the frequency will be as specified in the WP/QAAs.

3.5.2 Laboratory Quality Control Procedures

Laboratory QC procedures are used to provide measures of internal consistency of analytical and storage procedures. Specific QC procedures and QC criteria are in place for organic, inorganic, water quality parameter, and radiochemical analyses. The laboratory QC procedures and samples used are described in detail in the analytical methods cited and in the GRRASP. The GRRASP also specifies which type of laboratory QC samples are appropriate for the various types of analytes (i.e., organic and inorganic, and water quality parameters) and different methods of radionuclide analyses. All laboratory QC procedures shall be consistent with or equivalent to EPA-CLP QC procedures. For example, the EPA special guidance for continuous air and meteorological data will be used.

3.6 Data Assessment

EMAD is responsible for evaluating and validating analytical data from EM Department subcontract laboratories. The EMAD staff may be assisted in this task by subcontractor personnel who provide data review and validation support. In addition to validating data, the EMAD staff may assist the EM Department and subcontractor technical staff in determining data usability and acceptance.

3.6.1 Calculations

Calculations shall be performed according to approved procedures. To ensure defensibility of the records, calculations shall be legible and in logical progression so that the steps and the reasoning behind the calculations can be understood. For calculations performed using a programmable calculator or computer, a sample calculation will be included in the permanent files together with a program listing and printout of input data. The calculated results also shall be placed in the QA records system files. A calculation or series of calculations shall contain the following, as a minimum:

- Task number, date performed, and signature of person who performed the calculation.
- Purpose for calculation.
- Assumptions made or inherent in calculation.
- Reference (including page, where applicable) for each piece of input data (e.g., standard notebook, telephone memorandum, technical paper).
- Method used for calculations.
- Results (underlined).

Calculations shall be spot checked by an independent engineer or scientist of professional level equal to or higher than that of the originator. After completing the check, the reviewer shall sign his or her name and the date immediately below that of the originator on the calculations. Both the originator and reviewer are responsible for the completeness and

accuracy of the calculations and must initial any corrections or changes. This process certifies that the methodology or computer program is as expected.

3.6.2 Data Assessments

Field and laboratory data are assessed by reviewing field and laboratory data reports and identifying anomalous data. Any anomalous data will be flagged as invalid so that it will not be entered into the Rocky Flats environmental database, as described in Section 8. Analytical data will be assessed in two ways: (1) validity and (2) usability. Data validity and usability are closely related and may be assessed as:

V Valid; usable for all purposes.

A Acceptable with qualifications; usable for most purposes.

R Rejected; unusable for most purposes.

The quality, validity, and appropriate use of environmental measurement data collected for this project will be determined prior to use by the Data Users.

3.7 Data Validation and Usability Classification

The acceptance and review criteria for the following validation standards are specified in the GRRASP. The process for evaluating whether the criteria have been met are described in the validation functional guidelines documents referenced previously. Three levels of data validity have been established for the ER activities at the RFP.

a. Valid. Data meets the following seven objective standards, where applicable:

1. Analytical methods followed;
2. Sufficient number and type of QC samples analyzed;

3. Acceptance criteria for QC samples achieved;
4. Detection limits achieved;
5. Compounds and analytes correctly identified;
6. Equipment/instrumentation calibration criteria achieved; and
7. Sample holding times met.

b. Acceptable With Qualifications. Data meets most, but not all, objective standards. All primary validation criteria are achieved within acceptable limits (calibration, detection limits, method requirements, compounds and analytes correctly identified).

c. Rejected. Data fails to meet objective standards or fails to meet primary validation criteria.

The following three levels of data usability are utilized for the ER Program at the RFP.

a. Data is usable for all purposes if all of the following criteria are met:

- Data quality is classified as valid.
- All data quality objectives are achieved.
- All specific agreements and/or regulatory requirements are met.

b. Data is considered usable for some purposes if any of the following conditions occur:

- Data quality is classified as valid or acceptable with qualifications (rejected data may be usable for some very limited purposes such as screening).
- Not all data quality objectives are achieved.
- Not all specific program requirements are not met.

c. Data may be unusable if any or all of the following conditions are met:

- Data quality is classified as rejected.
- Data quality objectives are not achieved.
- Specific program requirements not met.

(Note: Rejected data shall be identified and controlled as outlined in Section 8, Identification and Control of Items, Samples, and Data.)

3.8 Peer Reviews

When ER activities involve state-of-the art or untried technologies, peer reviews of data, reports, conceptual designs, etc. shall be performed. A peer review team will be appointed by the EM Department Director or appropriate Manager(s). The peer review team shall consist of independent qualified experts. The review and approval of the team members' credentials, including verification of education and experience, shall be documented by the appropriate EM Department management representative. Peer reviews shall be documented and prepared by the peer review team leader, and approved by the EM Department management representative. During the peer review, all review comments shall be documented, as well as the resolution of all comments. Dissenting opinions which cannot be resolved shall also be clearly indicated.

The original document, submitted for peer review comments, and resultant changes to the documents shall be included in the document package and forwarded to the QA records management system.

3.9 Design Records

Design documentation for scientific investigations, analyses, and report preparation, including the design bases, input documents, references, design decision documentation, including but not limited to memoranda, analyses, drawings, specifications, as-built drawings and records, other design output documents, evidence of design verification/evaluation, qualification records of reviewers, and documents confirming interface control, with approved changes thereto, shall be considered QA Records and controlled in accordance with Section 17 of this QAPjP.

TITLE: PROCUREMENT DOCUMENT CONTROL Approved By:

5/2/91
Director, Environmental Management

TABLE OF CONTENTS

1.0 PURPOSE

This section defines the requirements and methods for the control of procurement documents associated with the purchase of items or services which would be expected to have a substantial impact on the quality of data used in support of environmental restoration activities.

2.0 APPLICABILITY

These methods are applicable to personnel who are involved with the procurement of items or services for environmental restoration activities. Procurement practices will be controlled by existing EG&G procurement guidelines.

3.0 REQUIREMENTS

The EM Department Division Managers, or delegates, shall initiate and maintain a procurement document package which includes provisions for the following:

- Scope of work
- EG&G technical requirements
- Requirements, as outlined in the IAG and applicable guidance documents
- Regulatory requirements
- Quality Assurance Program requirements
- Right of access to the supplier's plant facilities and records
- Documentation requirements
- Nonconformances and corrective actions
- Spare and replacement parts
- Commercial grade procurements
- Standard Operating Procedures
- EG&G Point-of-Contact

Once the requisition or contract is drafted, it shall be forwarded to the appropriate ER Division Manager for review and approval.

3.1 Review and Approval of Procurement Document Packages

EM Department Division Managers or their designees shall assure that a review of procurement documents and necessary revisions are made. The review ensures that documents transmitted to subcontractors, contractors, or vendors include provisions that services and associated deliverables will meet specified requirements. The review also shall verify that procurement documents contain provisions for requiring contractors,

subcontractors or vendors, and their subtiers, to implement appropriate QA programs. When required, written QA Programs are to be supplied prior to contract award.

After appropriate review, EM Department Division Managers shall approve or reject the procurement document package. Rejected procurement document packages shall be returned to the initiators. Approved procurement document packages shall be forwarded to the QACs for the appropriate ER Divisions.

The applicable QAC shall review the procurement document package to ensure it meets applicable regulatory requirements and the requirements of this QAPjP. After review, the QAPM shall approve or reject the procurement document package. Rejected procurement document packages shall be returned to the appropriate EM Department Division Manager. Approved procurement document packages shall be forwarded to the EG&G Procurement Department.

Procurement Department personnel shall maintain the procurement document package and transcribe all applicable requirements and information into the final purchase order or contract. These final documents shall be prepared and processed in accordance with Procurement Department procedures.

Procurement Department personnel shall not make any changes to the technical or QA requirements without the written concurrence of the appropriate EM Department Division Manager(s) and the QAPM prior to execution of the purchase order or contract.

Upon award of the purchase order or contract, Procurement Department personnel shall distribute copies to the appropriate EG&G Technical POC and the QAPM.

3.2 Procurement Document Changes

Changes to procurement documents shall be subjected to the same review and approval process as required for the preparation of the original document.

3.3 Quality Assurance Records

Procurement Department personnel shall forward a legible copy of each QA Record, EM Department purchase request, contract, and applicable purchase order to the EM Department QA Records Management System in accordance with the requirements of Section 17 of this QAPjP.

TITLE: INSTRUCTIONS, PROCEDURES, AND DRAWINGS

Approved By:

5/7/91
Director, Environmental Management

TABLE OF CONTENTS

1.0 PURPOSE

This section establishes the requirements and methods by which EM Department instructions, procedures, and drawings are prepared, reviewed, and approved.

2.0 APPLICABILITY

These requirements apply to all personnel involved in the generation, review, and approval of instructions, procedures, and drawings associated with the ER Program quality-affecting items or activities.

3.0 REQUIREMENTS

3.1 Procedures

Approved instructions, procedures, and drawings for activities affecting quality shall be followed as specified in this QAPjP and the specific WP/QAAs. SOPs and SOPAs will be incorporated into the WP/QAA for approval. In the event that compliance is not feasible or appears to be unreasonable, the person making such a determination will initiate action to resolve the questionable issue. In no event shall a documented requirement be bypassed or voided except by justified approval of the organization having authority for approving the requirement. Such deviation to the procedure shall be documented and approved utilizing the Procedure Deviation Notice described in Section 3.8. Activities which typically fall into this category include the following:

- Field operations
- Laboratory operations
- Data assessment
- Safety
- Surveillances
- Audits

Specific control requirements and related work instructions or procedures for these activities are described below.

3.1.1 Field Operations Procedures

Field operations procedures are documented to ensure that field and sampling activities meet required technical and evidentiary standards for all phases of field activities. Field operations and sampling SOPs shall be approved specifically for ER Program use.

3.1.2 Laboratory Operations Procedures

In general, analytical procedures for ER samples must be consistent with the GRRASP and the specific WP/QAAS and established SOPs.

3.2 Procedure Development and Approval

SOPs shall be prepared for each activity to the level of detail required to ensure that the activity can be consistently performed as required. SOPs shall include or refer to appropriate quantitative or qualitative acceptance criteria for determining that actions described within the SOP have been completed as specified and shall be uniquely identified, retrievable, and reproducible. If a SOP is canceled or superseded, its number will not be reused.

SOPs shall establish what is to be accomplished, by whom, when it will be done, under what conditions if conditions will affect quality, and where if location will affect quality. When procedures and instructions direct activities involving interfaces between organizations, they shall define those interfaces. They shall be sufficiently complete and detailed to ensure that data of known quality and integrity are generated to meet measurement objectives with a minimum loss of data due to out-of-control conditions. The SOPs shall be adequate to establish traceability of standards, instrumentation, samples, calibrations, and environmental data; consistent with sound scientific/engineering principles; consistent with current EPA regulations and guidelines; and consistent with the instrument manufacturer's specific instruction manuals if instrumentation is specified in the SOPs.

Procedures shall provide for documentation sufficiently complete to record the performance of all tasks and their results, explain the cause of missing information, and demonstrate the validation of information.

3.3 Procedure Format

Procedures shall be formatted to include the following sections as a minimum:

- Unique procedure identifier, including revision number.
- Purpose statement: a short statement about why the procedure/instruction is written and what it contains.
- Applicability or scope: a short description of the organizations/positions and activities to which the requirements apply.
- Responsibilities: a description of specific positions/organizations identified within the procedure.
- Procedure: a description of the actions necessary to accomplish the objectives identified in the purpose statement. The description shall address samples; equipment; instruments; personnel qualifications; documentation; verification; software; calibration; data collection, storage, and reduction; records; and required materials, as appropriate.
- Approval signatures and effective date.

3.4 Review

Procedures shall be reviewed for applicable technical, administrative, and quality requirement details. This review shall be independent and performed by other than the original author.

The reviews shall be performed by persons knowledgeable in the technical discipline and appropriate administrative details. The QAPM or designee shall review the procedure to assure incorporation of appropriate quality requirements.

3.5 Approval

Procedures, instructions, specification drawings, specific personnel, applicable documents, authorities, and subsequent revisions or cancellations shall be approved by the appropriate Department, Director, and Division Managers and QAPM. The DOE, EPA, and CDH will also approve revisions and cancellations prior to use as specified in the IAG.

3.6 Control and Issue

A written system for distribution and control of ER instructions, procedures, and drawings is identified in Section 6 of this QAPjP.

3.7 Revisions

Changes to written instructions, procedures, or drawings for activities affecting quality shall be reviewed and approved in a comparable manner as the original documents by the same organization responsible for the original document.

3.8 Change Control

A procedure deviation process includes the use of Figure 5-1, the Procedure Deviation Notice. Instructions for the form's use are included on the form.

3.8.1 Major Changes

Changes to documents, other than those defined as minor changes in section 3.8.2 below, are considered as major changes and shall be reviewed and approved by EPA, DOE, and/or CDH. The reviewing organization(s) shall have access to pertinent background data or information upon which to base their approval.

3.8.2 Minor Changes

Minor changes to documents, such as inconsequential editorial corrections or temporary changes that do not effect data quality will not require that the revised documents receive the approval of DOE, EPA, or CDH. Instead, the original approvers, including the QAPM, shall review the Procedure Deviation Notice and sign the form shown in Figure 5-1 allowing the temporary change to take effect. The QAPM shall have the responsibility for reviewing and evaluating temporary changes to determine any impact to data quality. The QAPM will provide the Procedure Deviatiopn Notice to EPA and CDH upon request for review.

3.9 Quality Assurance Records

A historical file of all original documents, and revisions and changes to instructions, procedures, and drawings shall be maintained in the QA Records Management System as described in Section 17 of this QAPjP.

Figure 5-1
PROCEDURE DEVIATION NOTICE

Document I.D. _____

	YES	NO (See Section 2)
Should this change be sent to DOE?	☐	☐
Should this change be sent to EPA?	☐	☐
Should this change be sent to CDH?	☐	☐

Action

If YES to any question, complete Section 1 and forward documents.

If NO to all questions, complete Sections 1 and 2.

Section 1

Current Description:

Recommended Change:

Initiator _____ Date _____ Manger _____ Date _____

Section 2

Reasons for Temporary Change:

Change Expires on _____ (No longer than 6 months)

Approved by Original EG&G Approval Personnel	Date
_____	_____
_____	_____
_____	_____
_____	_____

Figure 5-1 (Continued)

PROCEDURE DEVIATION NOTICE

Instructions for Use of the Procedure Deviation Notice

1. Initiator of the form answers top three questions and follows the appropriate Action plan.

2. Initiator completes Sections 1 and 2 as appropriate, and has his/her manager approve the form to this point. The Manager's signature shows concurrence with all the information completed on the form upon his/her receipt.

3. The form is then routed to the original approver(s) designees or replacements for signature. Each signature attests to the accuracy of the information.

4. When all the signatures are completed, the Temporary Change takes effect and lasts until the expiration data or six months from initiator signature, whichever is less.

TITLE: DOCUMENT CONTROL

Approved By:

5/7/91
Director, Environmental Management

TABLE OF CONTENTS

1.0 PURPOSE

This section establishes the requirements and methods of control for the preparation, review, approval, revision to, issuance and distribution of controlled documents.

2.0 APPLICABILITY

This section applies to ER Program controlled documents, including this QAPjP, procedures, SOPs, QAAs, and others as specified by the QAPM. Changes to documents designated as "controlled" shall be subject to the same control requirements as the original document. Document control assures that the most current, approved procedures and guidance documentation are being distributed for use on the ER program.

3.0 REQUIREMENTS

3.1 Document Issuance and Distribution

Documents shall be released for issuance and distribution in accordance with written and approved document control procedures. Control of documents involves issuing the correct revisions of the document to the designated individuals at the designated locations, and assuring that current documents are available prior to commencing work and at the location where work is to be performed. Document control practices shall include provisions for the following:

- Identifying the individuals or organizations responsible for preparation, review, approval, revision, and release of the document.

- Independent review of documents by qualified personnel for technical adequacy, completeness, correctness, and inclusion of appropriate quality requirements prior to approval and issuance.

- Documenting review comments and comment resolutions.

- Identifying effective date for each controlled document, and changes.

- Identifying and uniquely marking documents, including documents circulated during review prior to completion of the approval process.

- Specifying and maintaining controlled document distribution lists.

- Marking, removing, or destroying obsolete or superseded documents.

- Maintaining an index of revision status for controlled documents.

- Using receipt acknowledgement document transmittal forms, as applicable.

- Changing documents in the same controlled manner as the original document.

3.2 Quality Assurance Records

Controlled documents are QA records to be controlled in accordance with Section 17 of this QAPjP.

TITLE: CONTROL OF PURCHASED ITEMS AND SERVICES

Approved By:

5/7/91
Director, Environmental Management

TABLE OF CONTENTS

1.0 PURPOSE

This section establishes the requirements and methods for vendor selection and the control of purchased items and services.

2.0 APPLICABILITY

These requirements apply to EM Department and EM Department-contracted personnel involved in the procurement of items and services for environmental restoration activities which would be expected to have a substantial impact on the data quality used in support of environmental restoration activities.

3.0 REQUIREMENTS

3.1 Procurement Planning

Procurement planning is achieved through use of the checklist and documents specified in existing EG&G procurement guidelines.

Procurement planning results in the documented identification of procurement methods and the sequence of actions, deliverables, and milestones. Procurement planning also includes the tracking to the completion of these activities and the designation of applicable procedures for these activities.

3.2 Acceptance of Items or Services

The method for acceptance of items or services will be identified on the checklists/forms provided in the "QA Plan for Procurement Requisitioners QA Program." Methods for accepting the final product shall be noted and may include:

- Receipt inspection through technical or peer review of the information.
- Receipt inspection through physical inspection of the product.
- Acceptance of Certificates of Conformance from the supplier.
- Post-installation testing of item, software, or other product.
- Surveillance or audit of activity.
- Technical verification of data produced.

- Review of objective evidence for conformance to the procurement document requirements (i.e., certifications, reports, etc.).

3.3 Selection of Contractors, Vendors, or Subcontractors

The selection of contractors, vendors, or subcontractors shall be based on evaluation of their ability to provide items or services in accordance with the requirements of the procurement documents prior to award of the contract or purchase order. The evaluation and selection shall be documented and shall include the contractor's/vendor's/subcontractor's history and capability of providing the service or product required.

3.4 Verification of Acceptability of Contractor/Supplier Performance

The extent of verification activities shall be a function of the relative importance, complexity, and quantity of the item or services procured. Verification activities shall be accomplished at the direction of the QAPM or delegates.

3.5 Control of Contractor/Supplier Nonconformances

Contractors and suppliers may be required to submit any nonconformance or corrective actions generated in the development of their product or service. The QAPM shall coordinate the review of supplier nonconformances and corrective actions within the EM Department.

3.6 Quality Assurance Records

Records generated by the procurement process shall be maintained in accordance with Section 17 of this QAPjP.

TITLE: IDENTIFICATION AND CONTROL OF ITEMS, SAMPLES, AND DATA

Approved By:

5/2/91
Director, Environmental Management

TABLE OF CONTENTS

1.0 PURPOSE

This section establishes the requirements and methods for identifying and controlling items, samples, and data that affect quality. These methods are used to assure that only correct and accepted items, samples, and data are collected, used, or installed.

2.0 APPLICABILITY

The requirements of Section 3.1 apply primarily to engineered and/or manufactured items, parts, and components that are used to collect and analyze samples and/or data during the investigation and study phase of the ER Program, and that have the potential to impact the quality of those samples and/or data. Materials such as field rinsates, reagents, and calibration standards are also considered items that could affect the quality of samples and/or data. Sections 3.2 and 3.3 describe the controls for samples and data that are collected during ER Program activities.

3.0 REQUIREMENTS

3.1 Items

3.1.1 Physical Identification of Items

Physical identification of items, parts, components, and materials shall be used. Identifying markings shall be permanent and legible and shall not adversely affect the function, service, or archival life of the item. When identification on the item is impractical, physical segregation, record traceability, or other methods shall be described in written procedures.

Items considered critical shall be physically identified by any of the following means, as applicable: (a) stenciled or etched markings, (b) strip markings, (c) imprinted tape, (d) tagging, (e) color coding, (f) records traceable to the item, (g) procedural control, or (h) other appropriate means in accordance with approved procedures.

When it is impractical to physically identify small items, these may be identified as to heat numbers, batch, lot, or specification by applying markings to bags, bins, tanks, or other suitable containers.

Identification of items shall provide the required degree of traceability to pertinent documents. All markings shall be clear, unambiguous, indelible, and shall not affect the function of the item. Markings shall not be obliterated or hidden by surface treatment or coatings unless other means of identification is substituted. When an item is subdivided, markings shall be transferred to each part of the item.

If adhesive labels are selected as a method of item identification, the labels will be evaluated for compatibility with the environment to which they will be exposed (e.g., radiation, temperature, weather, etc.) as well as the chemical composition of the adhesive on the labels in order to avoid contamination of the sample.

Only tags that can be attached to an item without damaging the item shall be used. The material that attaches the tag to the item must be evaluated to assure that it will not chemically alter the item.

Compounds used to mark items will be evaluated to preclude affecting or damaging the items that are being identified and controlled.

3.1.2 Control of Items with Finite Shelf Life

Items with finite shelf life shall be controlled and physically identified to assure that they are provided the adequate protection for their shelf lives. Manufacturers instructions (such as disposal instructions provided on Material Safety Data Sheets) and internal RFP policies and procedures will be adhered to when disposing of items with expired shelf lives.

Storage areas shall be protected to provide for access control as well as maintenance of environmental storage conditions, (e.g., temperature, humidity, light, etc.). During storage, provisions shall be made for maintenance or replacement of markings and identification records resulting from damage during handling or aging, for protection of identifications on

items subject to excessive deterioration due to environmental exposure, and for updating existing records when the storage location changes.

3.1.3 Distribution

When items with specific traceability requirements (i.e., personnel, date, organization, item, classification, transaction, return requirements, or documentation) are distributed outside of the RFP, a distribution record will be completed to assure C-O-C requirements are met. The transfer of the item shall be reflected in the quality assurance record.

3.2 Samples

3.2.1 General

A "sample" is physical evidence collected from a facility or the environment. An essential part of the QA Program is the control of this evidence (i.e., sample) gathered from the facility or environment. To accomplish this, sample identification and C-O-C procedures described in SOP 1.13 and illustrated in Figure 8-1, Sample collection, analysis and chain-of-custody flow, shall be followed. Samples required to be analyzed will be handled in accordance with the guidelines described in this section and the field sampling SOPs listed in Table 2-1. Field sampling SOPs include 2.6, 3.2, 3.4, 3.7, 3.8, 3.9, 4.3, 4.6, 4.7, and 4.8.

Radiological screening is required for surface water, groundwater, soils, surficial deposits (e.g., alluvial samples) bedrock and others as determined by Health and Safety and the EG&G Program Manager and is illustrated in Figure 8-2, Radiological Screening of Field Samples.

3.2.2 Physical Identification of Samples

All samples shall have unique identification that traces the sample to the source(s) and indicates the method(s), date, and conditions prevailing at the time of sampling, as well as other pertinent information as described in the WP and SOPs. The EG&G sample number system is maintained by the EMAD Analysis and Modeling Group (EMAD AMG). The numbering system includes a description ID and sample number and a subcontractor ID. Once a WP/QAA is approved, the EG&G PM for the project will request a Project ID prefix, block of sample numbers, and a subcontractor ID suffix if they have not previously been assigned. The project ID typically will identify the media type such as:

GW = Groundwater sample
SW = Surface water sample

The sample ID number will contain the following information as part of a nine-character, alpha-numeric code:

Character(s)	Description	Code
1 and 2	Project ID	GW
3 through 7	Sample Number	00001 to 99999
8 and 9	Subcontractor ID	Alpha (e.g. IT - International Technology Corp.)

Sample numbers will be assigned on a daily basis by the subcontractor's sample manager. Numbers will be assigned consecutively, beginning with 00001. Assignment of sample numbers will be tracked and maintained on the subcontractor's computer at the subcontractor's base laboratory.

Laboratory sample number and data tracking is addressed in the GRRASP and in the EG&G "Procedures for Providing the Electronics Deliverable Lab Data to the Rocky Flats Environmental Data Tracking System."

Samples will be placed in or on appropriate containers and shall be packaged, labeled, and prepared for shipment following procedures specified in SOP 1.13. The sample number shall be documented on the field data collection form or in a sample collection logbook (as specified in SOP 1.13) which identifies the sample.

The history of each sample and its handling is documented from its collection through all transfers of custody, using the C-O-C form shown on Figures 8-3a and 8-3b, until it is transferred to an analytical laboratory. Internal laboratory records then document the custody of the sample through its final disposition. Internal laboratory procedures addressing sample receipt and log-in, sample storage and security, sample tracking, and sample documentation are required for each laboratory that provides analytical services for the ER program. The GRRASP requires that these procedures be developed by each participating laboratory and that they be submitted to EG&G for review and approval prior to receiving samples from the RFP.

The handling and disposal of decontamination and wash water, drilling fluids and cuttings, and residual core and laboratory samples will be done according to procedures specified in SOPs 1.5, 1.7, 1.8, 1.9, and 1.10.

When onsite measurements are made, the data shall be recorded directly in logbooks or field data records, with identifying information (including such information as project code, station number, station location, date, time, sampler), field observations, and remarks. Examples of onsite measurements include pH, temperature, conductivity, flow measurement, continuous air monitoring, and stack gas analysis. If it is impractical to place complete identification on

Figure 8-3a

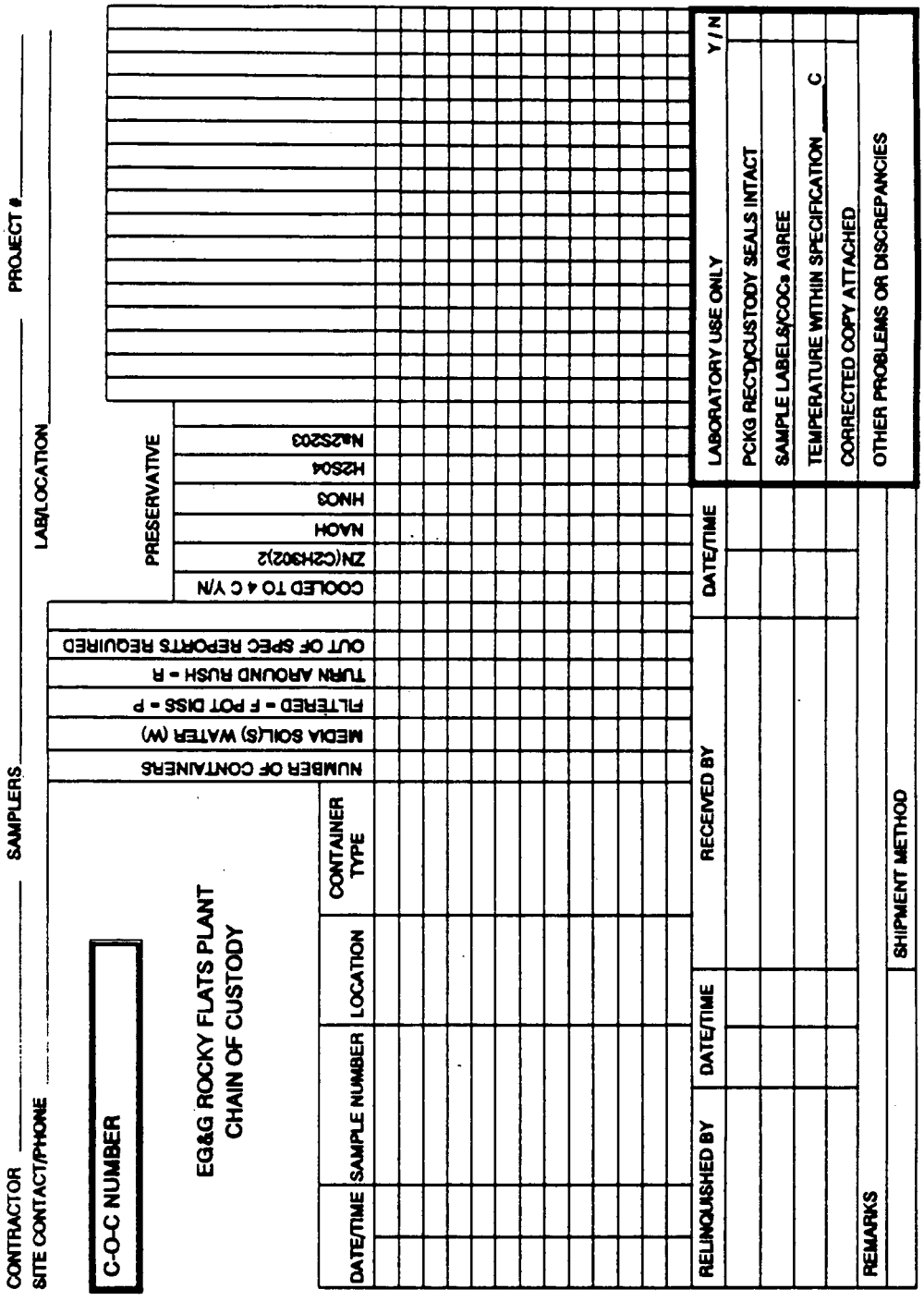

CONTRACTOR
SITE CONTACT/PHONE
SAMPLERS
LAB/LOCATION
PROJECT #
C-O-C NUMBER
EG&G ROCKY FLATS PLANT
CHAIN OF CUSTODY
DATE/TIME
SAMPLE NUMBER
LOCATION
CONTAINER TYPE
NUMBER OF CONTAINERS
MEDIA SOIL(S) WATER (W)
FILTERED - F POT DISS - P
TURN AROUND RUSH - R
OUT OF SPEC REPORTS REQUIRED
PRESERVATIVE
COOLED TO 4 C Y/N
ZN(C2H3O2)2
NAOH
HNO3
H2SO4
N.2S203
RELINQUISHED BY
DATE/TIME
RECEIVED BY
DATE/TIME
LABORATORY USE ONLY
Y/N
PCKG RECD/CUSTODY SEALS INTACT
SAMPLE LABELS/COCs AGREE
TEMPERATURE WITHIN SPECIFICATION ___ C
CORRECTED COPY ATTACHED
OTHER PROBLEMS OR DISCREPANCIES
REMARKS
SHIPMENT METHOD

FIGURE 8-3b

ANALYSIS	ABBREVIATION	PRESERVATIVE
Volatile Organic Analysis		
CLP Deliverables	VOA-CLP	HCl to extend holding time
Method 502.2	VOA-502.2	$Na_2S_2O_3$ if Cl_2 is present, Cool to 4°C
Method 624/8240	VOA-624	
Semi-Volatile Organic Analysis		
CLP Deliverables	BNA-CLP	$Na_2S_2O_3$ if Cl_2 is present, Cool to 4°C
Method 625/8270	BNA-625	
Organo-Chlorine Pesticides/PCBs		
CLP Deliverables	Pest/PCB-CLP	Cool to 4°C
Method 608/8080	Pest/PCB-608	
Triazine Herbicides		
Method 619	Triazines	Cool to 4°C
Chlorinated Herbicides		
Method 615/8150	Herb-615	Cool to 4°C
Polynuclear Aromatic Hydrocarbons		
Method 610/8100	PAH	$Na_2S_2O_3$ if Cl_2 is present, Cool to 4°C
Dioxin (2,3,7,8 TCDD)		
Method 613/CLP Deliverables	Dioxin	$Na_2S_2O_3$ if Cl_2 is present, Cool to 4°C
Oil and Grease	O&G	H_2SO_4 to pH < 2, Cool to 4°C
Metals HSL-TAL		
CLP Deliverables	Metals }	HNO_3 to pH < 2, Cool to 4°C, filter for dissolved
Lithium, Molybdenum, Strontium	Li, Mo, Sr }	
Tin, Cesium, Silica	Sn, Cs, Si }	
Cyanide	CN	NaOH to pH > 12, $C_6H_8O_6$ if Cl_2, Cool to 4°C
RADIOCHEMISTRY	RADS	HNO_3 to pH < 2, filter for dissolved
Gross Alpha/Beta	Gross A/B	HNO_3 to pH < 2, filter for dissolved
Plutonium239/240	Pu239/240 }	HNO_3 to pH < 2, filter for dissolved
Americium241	Am241 }	HNO_3 to pH < 2, filter for dissolved
Uranium 233, 234, 235/238	U233, 234, 235/238	HNO_3 to pH < 2, filter for dissolved
Strontium89/90	Sr89/90 }	HNO_3 to pH < 2, filter for dissolved
Cesium137	Cs137 }	HNO_3 to pH < 2, filter for dissolved
Radium 226, 228	Ra226,228 }	HNO_3 to pH < 2, filter for dissolved
Tritium	H3	
Curium244	Cm244 }	HNO_3 to pH < 2, filter for dissolved
Neptunium237	Np237 }	HNO_3 to pH < 2, filter for dissolved
Thorium230/232	Th230/232 }	
Dissolved Organic Carbon	DOC	Filtered, Cool to 4°C
Toxicity-Ceriodaphnia, Fathead Minnow	Acute Tox	Cool to 4°C
Biochemical Oxygen Demand		
Carbonaceous 5day	CBOD5	Cool to 4°C
Biochemical Oxygen Demand, 5day	BOD5	Cool to 4°C
Chemical Oxygen Demand	COD	Cool to 4°C
Total Organic Carbon	TOC	Cool to 4°C
Total Dissolved Solids	TDS	Cool to 4°C
Nitrite	NO2	Filtered, Cool to 4°C
Orthophosphate	o-Phos	Filtered, Cool to 4°C
Total Phosphorous	Tot Phos	H_2SO_4 to pH < 2, Cool to 4°C
Nitrate/Nitrite as N	NO3/NO2	H_2SO_4 to pH < 2, Cool to 4°C
Ammonia as N	NH4	H_2SO_4 to pH < 2, Cool to 4°C
Total Kjeldahl Nitrogen	TKN	H_2SO_4 to pH < 2, Cool to 4°C
Total Suspended Solids	TSS	Cool to 4°C
NonVolatile Suspended Solids	NVSS	Cool to 4°C
Chloride	Cl	Cool to 4°C
Fluoride	F	Cool to 4°C
Sulfate	SO4	Cool to 4°C
Carbonate	CO3	Cool to 4°C
Bicarbonate	HCO3	Cool to 4°C
Hexavalent Chromium	Cr^{VI}	Cool to 4°C
Sulfide as H2S	H2S	NaOH to pH > 12, $Zn(C_2H_3O_2)_2$, Cool to 4°C
Total Coliform	Tot Coli	$Na_2S_2O_3$, Cool to 4°C
Fecal Coliform	F-Coli	$Na_2S_2O_3$, Cool to 4°C
Total Bacteria	Tot Bact	Cool to 4°C

the sample, methods shall be described and documented in the WP/QAA to assure that samples are not mixed with like samples and that the correct identification of samples is verified and documented prior to release for use by the sample tracker. The unique sample identification (identifying sample origin and documentation) shall remain as the identification number from the point of sample collection through disposal.

3.2.3 Sample Labels

The sample labels shall be attached to each sample or container according to SOP 1.13, unless otherwise specified in the WP and/or specific field sampling SOP.

3.2.4 Chain-of-Custody

Chain-of-Custody shall be maintained on all samples affecting the DQOs. The purpose of these procedures is to preserve the representativeness and integrity of the samples during collection, transportation, and storage prior to analysis. A sample is considered to be in an individual's custody if the sample is: (1) in the physical possession of the responsible party, (2) in one's view after being in one's physical possession, (3) secured to prevent tampering, or (4) placed in a secured area by the custodian.

The C-O-C for sample flow from field collection to the receipt at the laboratory was illustrated in Figure 8-1. A sample C-O-C Form was illustrated in Figures 8-3a and 8-3b. Sample custody procedures, including C-O-C documentation, shall be in conformance with authorized SOP 1.13 and the GRRASP (Exhibit III Section 1). EMAD must be contacted for destination laboratory identification and scheduling.

3.2.5 Sample Hold Times

Specific holding time references for samples are included in the GRRASP and in Appendices A and B of SOP 1.13. Additional requirements may be identified in the site-specific WP/QAAs.

Sample Holding Times are defined as the duration between date of sample collection and dates of sample preparation (extraction/distillation) and analysis. For water samples, the holding times specified in 40 CFR 136 shall be applicable to this program. The Validated Time of Sample Receipt (VTSR) from the CLP-SOWs will also apply to laboratory holding times with one exception. The VOA holding time of 10 days is reduced to 7 days to conform with EPA data validation guidelines for volatile organics. Where discrepancies exist between the 40 CFR 136 criteria and CLP VTSR criteria, the former shall take precedence. Sample container, preservative, and holding time specifications for ER program samples are specified in Tables 8-1 through 8-4, and are proceduralized in SOP 1.13.

3.2.6 Sample Transport

Once samples are taken, they are transported from the sample location to a laboratory or other location for analysis. When sent by common carrier, samples, as required, shall be packaged and labeled according to procedures specified by the U.S. Department of Transportation (DOT) (Code of Federal Regulations, 49) or the state, whichever is more stringent. However, before removal, a sample is often divided, depending upon the analyses to be performed. Each portion is preserved in accordance with approved SOP 1.13 and Tables 8-1 through 8-4. The sample container is identified by a sample label; the information recorded on the sample label plus amplifying remarks shall be present.

Shipping containers shall be padlocked or sealed with custody tape to detect tampering for shipment to the laboratory. The method of shipment, courier name, and other pertinent

information is entered in the "Remarks" section on the custody record. Sample shipments shall be accompanied by the C-O-C record identifying its contents. The original record shall accompany the shipment, and the copy shall be retained as specified in the SOP.

If samples are sent by mail, the package shall be registered with return receipt requested. If sent by common carrier or air freight, proper documentation must be maintained; e.g., bill of lading (which becomes an extension of the C-O-C).

When transferring the possession of samples, the individuals relinquishing and receiving shall sign, date, and note the time on the record. This record documents sample custody transfer from the sample, often through another person, to the sample custodian in the laboratory.

3.2.7 Sample Storage

While the samples are in storage (under C-O-C procedures), the proper environmental conditions shall be maintained to avoid degradation of the samples. Tables 8-1 through 8-4 list holding times and preservation specifications. Physical separation of samples to prevent mixing with like samples shall be accomplished to assure maximum traceability and safety of samples in storage.

3.3 Data

Data management for the ER Program is contained in the Rocky Flats Environmental Data System (RFEDS). Management of field data and entry into RFEDS is controlled by SOP 1.14, Data Base Management. SOP 1.14 describes the requirements for data receipt and completeness checks, data entry, and data validation.

TABLE 8-1
SAMPLE CONTAINERS, SAMPLE PRESERVATION, AND SAMPLE HOLDING TIMES FOR TARGET COMPOUND AND TARGET ANALYTE LISTS

WATER MATRIX

Parameter	Container	Preservative	Holding Time
Liquid - Low to Medium Concentration Samples			
Organic Compounds:			
Purgeable Organics (VOCs)	2 x 40-mL VOA vials with teflon lined septum lids	Cool, 4°C[a] with HCl to pH<2	7 days 14 days
Extractable Organics (BNAs), Pesticides and PCBs	1 x 4-L amber[b] glass bottle	Cool, 4°C	7 days until extraction, 40 days after extraction
Organophosphorus Pesticides and Herbicides	1 x 4-L amber[b] glass bottle	Cool, 4°C	7 days until extraction, 40 days after extraction
Dioxins/Furans	2 x 1-L amber[b] glass bottles	Cool, 4°C	7 days until extraction, 40 days after extraction
Inorganic Compounds:			
Metals (TAL)	1 x 1-L polyethylene bottle	Nitric acid pH<2	6 mo[c]
Cyanide	1 x 1-L polyethylene bottle	Sodium hydroxide[d] pH>12; Cool 4°C	14 days
Sulfide	1 x 1-L polyethylene bottle	1 mL-zinc acetate sodium hydroxide to pH>9; Cool, 4°C	7 days

[a] Add 0.008 % sodium thiosulfate ($Na_2S_2O_3$) in the presence of residual chlorine

[b] Container requirement is for any or all of the parameters given.

[c] Holding time for mercury is 28 days.

[d] Use ascorbic acid only if the sample contains residual chlorine. Test a drop of sample with potassium iodine-starch test paper; a blue color indicates need for treatment. Add ascorbic acid, a few crystals at a time, until a drop of sample produces no color on the indicator paper. Then add an additional 0.6g of ascorbic acid for each L of sample volume.

TABLE 8-1 (continued)
SAMPLE CONTAINERS, SAMPLE PRESERVATION, AND SAMPLE HOLDING TIMES
FOR MISCELLANEOUS PARAMETERS

WATER MATRIX

Parameter	Sample Volume /Container	Preservative	Holding Time
Liquid - Low to Medium Concentration Samples			
Acidity	200 mL/P, G	Cool, 4°C	14 days
Alkalinity	200 mL/P, G	Cool, 4°C	14 days
Bacteriological	1 L/P, G	Cool, 4°C	6 hr
Static Bioassay	4 L	Cool, 4°C	48 hr
Biochemical Oxygen Demand (BOD)	2 L/P, G	Cool, 4°C	48 hr
Chemical Oxygen Demand (COD)	300 mL, P, G	Cool, 4°C, Sulfuric Acid to pH < 2	28 days
Chloride	200 mL/P, G	None	28 days
Chlorine Residual	In situ, beaker or bucket	None	Analyze immediately
Color	200 mL	Cool, 4°C	48 hr
Conductivity	300 mL/P, G	Cool, 4°C	28 days (determine on-site if possible)
Chromium, Hexavalent	200mL/P, G	Cool, 4°C	24 hr
Dissolved Oxygen (Probe)	In situ, beaker or bucket	None	Determine on-site
Dissolved Oxygen (Winkler)	300 mL glass, BOD bottle	Fix on site, store in dark	8 hr (determine on-site if possible)

TABLE 8-1 (continued)
SAMPLE CONTAINERS, SAMPLE PRESERVATION, AND SAMPLE HOLDING TIMES
FOR MISCELLANEOUS PARAMETERS

WATER MATRIX

Parameter	Sample Volume /Container	Preservative	Holding Time
Liquid - Low to Medium Concentration Samples (continued)			
Toxicity Characteristic Leaching Procedure (TCLP)	4 L amber glass	Cool, 4°C	Extract within 7 days, analyze within 40 days
Fluoride	1 L/P	None	28 days
Hardness	300 mL/P, G	1:1 Nitric Acid, pH<2	6 mo
Nutrients*	2 L/P, G	1:1 Sulfuric Acid, pH<2, Cool, 4°C	28 days
Oil and Grease	2 x 1-L widemouth glass with Teflon liner	1:1 Sulfuric Acid, pH<2, Cool, 4°C	28 days
Organic Halides - Total (TOX)	250 mL amber glass with Teflon lined septum closure	Sulfuric Acid, pH<2; Cool, 4°C	14 days
pH	In situ, beaker or bucket	None	Analyze immediately
Phenols	1-L amber glass with Teflon lined closure	1:1 Sulfuric Acid, pH<2, Cool, 4°C	28 days
Phosphate-Ortho	500 mL/P, G	Filter-on-site, Cool, 4°C	48 hr
Phosphorus, Total Dissolved	500 mL/P, G	Filter-on-site, 1:1 Sulfuric Acid, pH<2, Cool, 4°	28 days
Radiological Tests	4-L "container/P"	Nitric Acid to pH<2	6 mo

* May include nitrogen series (ammonia, total Kjeldahl, nitrogen, nitrate-nitrite), total phosphorus, chemical oxygen demand.

TABLE 8-1 (continued)
SAMPLE CONTAINERS, SAMPLE PRESERVATION, AND SAMPLE HOLDING TIMES
FOR MISCELLANEOUS PARAMETERS

WATER MATRIX

Parameter	Sample Volume /Container	Preservative	Holding Time
Liquid - Low to Medium Concentration Samples (continued)			
Solids, Settleable	2 L/P, G	Cool, 4°C	48 hr
Solids (Total and Suspended, etc.)	1 L/P, G	Cool, 4°C	7 days
Sulfates	500 mL/P, G	Cool 4°C	28 days
Sulfides	1 L/P, G	2 mL Zinc Acetate Conc. Sodium Hydroxide to pH>9 Cool, 4°C	7 days
Temperature	In situ, beaker or bucket	None	Analyze immediately
Turbidity	200 mL/P, G	Cool 4°C	48 hr

Abbreviations: ASAP - as soon as possible
NS - not specified
P - Plastic
G - Glass

Note: When nonspecific container type is listed (e.g., 8-oz. wide-mouth glass jar), select a container appropriate to the volume and container requirement given. Samples for more than one parameter can be collected into a single container if container and preservation requirements are the same (e.g., sulfate and turbidity).

TABLE 8-2
SAMPLE CONTAINERS, SAMPLE PRESERVATION; AND SAMPLE HOLDING TIMES
FOR TARGET COMPOUND AND TARGET ANALYTE LISTS

SOIL MATRIX

Parameter	Container	Preservative	Holding Time
Soil, Sediment or Sludge Samples - Low to medium Concentrations			
Organic Compounds:			
Purgeable Organics (VOCs)	2 x 120-mL VOA vials	Cool, 4°C	7 days
Extractable Organics (BNAs), Pesticides and PCBs	1 x 8-oz wide-mouth glass jar	Cool, 4°C	7 days until extraction, 40 days after extraction
Organophosphorus Pesticides and herbicides	1 x 8-oz wide-mouth[b] glass jar	Cool, 4°C	7 days until extraction, 40 days after extraction
Dioxins/Furans	1 x 8-oz wide-mouth glass jar	Cool, 4°C	7 days until extraction, 40 days after extraction
Inorganic Compounds:			
Metals (TAL)	1 x 8-oz wide-mouth glass jar	None	6 mo[1]
Cyanide	1 x 8-oz wide-mouth glass jar	None	14 days
Sulfide	1 x 8-oz wide-mouth glass jar	None	7 days

[1] Holding time for mercury is 28 days.

TABLE 8-2 (continued)
SAMPLE CONTAINERS, SAMPLE PRESERVATION, AND SAMPLE HOLDING TIMES
FOR TARGET COMPOUND AND TARGET ANALYTE LISTS

SOIL MATRIX

Parameter	Sample Volume /Container	Preservative	Holding Time
Soil, Sediment or Sludge Samples - Low to medium Concentrations			
Toxicity Characteristic Leaching Procedure (TCLP)	8-oz wide-mouth glass with Teflon®-lined lid closure	None	Extract 7 days, Analyze within 40 days
Nutrients, including: Nitrogen, Phosphorus, Chemical Oxygen Demand	8-oz wide-mouth glass with Teflon®-lined closure	None	ASAP
Other Inorganic Compounds	8-oz wide-mouth glass with Teflon®-lined closure	None	ASAP

Abbreviations: ASAP - as soon as possible
NS - not specified
P - Plastic
G - Glass

Note: When no specific container type is listed (e.g., 8-oz. wide mouth glass jar), select a container appropriate to the volume and container requirements given. Samples for more than one parameter can be collected into a single container if container and preservation requirements are the same.

TABLE 8-3
SAMPLE CONTAINERS, SAMPLE PRESERVATION, AND SAMPLE HOLDING TIMES
FOR RADIOLOGICAL SAMPLES

WATER MATRIX

Parameter	Container	Preservative	Holding Time
Radiological tests[1]	1-gallon plastic	HNO3 to pH<2	6 mos.
Tritium	125 ml glass	None	None

[1] For Radiological Testing, the specific analyses will be defined as some or all of the following: Gross Alpha, Gross Beta, Uranium 233+234, 235 and 238, Americium 241, Plutonium 239+240, Tritium, Strontium 89+90, Cesium 137, Radium 226, 228.

TABLE 8-4
SAMPLE CONTAINERS, SAMPLE PRESERVATION, AND SAMPLE HOLDING TIMES
FOR RADIOLOGICAL SAMPLES

SOIL MATRIX

Parameter	Container	Preservative	Holding Time
Radiological tests[1] and Tritium	1 liter glass	None	None

[1] For Radiological Testing, the specific analyses will be defined as some or all of the following: Gross Alpha, Gross Beta, Uranium 233+234, 235 and 238, Americium 241, Plutonium 239+240, Tritium, Strontium 89+90, Cesium 137, Radium 226, 228.

The ER program data storage and information system (RFEDS) is the responsibility of the EM Department EMAD Division Manager. The system shall be capable of receiving all entered data; screening and validating data to identify and reject outliers or errors; preparing, sorting, and entering all data into the data storage files (which are either computerized or manual). Data shall be stored in a manner that it will be traceable and retrievable. It will be protected against damage, loss, or tampering.

All data generated, produced, and archived in RFEDS shall be retrievable and traceable, as stated in the IAG. These data are identified in the site-specific WPs and QAAs. The QAA shall specify the applicable QA Records to be maintained in accordance with Section 17 of this QAPjP.

TITLE: CONTROL OF PROCESSES

Approved By:

5/2/91
Director, Environmental Management

TABLE OF CONTENTS

1.0 CONTROL OF PROCESSES

Criterion 9 of ASME NQA-1 requires the control of special processes that affect quality of items or services. Special processes are defined as processes which are highly dependent on the control of the processes or the skill of the operators, or both, and in which the specified quality cannot be readily determined by inspection or test of the product. The QA/QC controls for the ER activity processes of data collection (sampling), analyses, validation, reduction, assessment, and reporting are discussed in Section 3, Sampling Procedures and Investigations Control, and in the EG&G SOPs listed in Table 3-1. The establishment of acceptance criteria for ER activities is accomplished through the development of DQOs, which are discussed in Section 3 and in Appendix A, Data Quality Objective Development Process.

Other methods for controlling processes which may affect the quality of items and services or the validity of data are an integral part of other sections of this QAPjP, such as Section 4, Procurement Document Control; Section 7, Control of Purchased Items and Services; Section 8, Identification and Control of Items, Samples, and Data; Section 12, Control of Measuring and Test Equipment; and Section 13, Handling, Storage, and Shipping of Samples and Items. Since the control of ER activity processes are addressed in other portions of the QAPjP and in the EG&G SOPs listed in Table 2-1, process control is not discussed further in this section.

TITLE: INSPECTION

Approved By:

5/7/91
Director, Environmental Management

TABLE OF CONTENTS

1.0 PURPOSE

This section describes the requirements and methods for performing inspections of quality-affecting items or activities and the requirements for qualification and certification of inspection personnel.

2.0 APPLICABILITY

These requirements are applicable to all EM Department Program personnel and their subcontractors who plan or conduct inspections of items, systems, or components (e.g., inspection of monitoring wells, both materials and installation).

3.0 REQUIREMENTS

3.1 Personnel

- Inspection personnel shall report to the QAPM. Inspection personnel shall not report directly to immediate supervisors who are responsible for performing the work being inspected.

- Personnel conducting inspections must be independent of the activity inspected.

- Inspection personnel who verify conformance of work activities for purposes of acceptance shall be qualified/certified to perform the assigned inspection task.

- Written procedures shall describe the methods and requirements for qualification and certification of inspection personnel.

3.2 Inspection Planning

Inspection Planners will consider the following:

- Identification of required procedures, drawings, and specifications, including revisions.

- Specification of necessary measuring and test equipment, including accuracy and precision requirements.

- Inspection hold points[3] are established within the controlling SOP(s) or through development of inspection checklists. Inspection hold points shall include provisions to ensure that work will not proceed without the specific consent of EM Department representatives. The EM Department representative responsible for disposition of hold points shall be knowledgeable of the controlling SOP and process control requirements. This responsible representative shall also be knowledgeable of the Federal and State regulatory requirements and IAG agreements, which could be impacted by stop-work and/or resumption of the RI/RFI activity.

- Procedures for sampling. The sampling procedure shall be based on approved sampling practices.

- Procedures for documentation. Documentation shall identify characteristics, methods, and acceptance criteria, and shall provide for recording objective evidence of inspection results.

3.3 Inspection Process

Inspections shall be performed using procedures, instructions, and/or checklists which provide the following as appropriate:

- Identification of activities, items, and/or characteristics to be inspected.

- The method of inspection (e.g., visual, physical measurements, tests, etc.).

[3]Hold points are steps within procedures that must be witnessed by an inspector and determined to be satisfactory before progressing to the next step.

- Requirements for and documentation of the qualification of individuals responsible for performing the inspection operation.

- Acceptance and rejection criteria of the item or activity being inspected.

- Required procedures, drawings, and specifications.

- Specifications for measuring and test equipment required, including range and accuracy requirements.

- Documentation of what was inspected and when it was inspected.

The inspection process relates the real-time inspection of activities and items to qualitative acceptance criteria defined in specifications, drawings, checklists, etc. The inspection process can be applied to a specific item that is being used within an ER activity or process (e.g., well casing installed in monitoring wells) to ensure the item meets design specifications. The inspection can also be applied to a phase of the activity or process (e.g., isolating the alluvium from bedrock with grouted casing in monitoring wells). Inspections can also consist of final inspections conducted when the process or activity is complete to assure that specifications have been met.

A combination of inspections and process monitoring methods shall be performed in a systematic manner to ensure that the specified requirements for control of the process and quality of the item or activity are being achieved throughout the duration of the process. Controls (i.e., hold points), where required, shall be established and documented to assure the coordination and sequencing of successive stages of the conducted process or activity. When final inspections are performed, they will include a records review of the results and resolution of nonconformances identified in any prior inspections of items and/or phases of

the process or activity. The acceptance of items shall be documented and approved by authorized personnel.

3.4 Status Indicators

Status indicators (including calibration status labels, hold, accept, object, nonconforming material tags) shall be implemented as described in Section 14 of this QAPjP.

3.5 Nonconformances

All nonconformances shall follow the procedures described in Section 15 of this QAPjP.

3.6 Corrective Actions

Corrective actions and corrective action dispositions shall follow the procedures described in Section 16 of this QAPjP.

3.7 Quality Assurance Records

QA Inspection Records shall be handled in accordance with Section 17 of this QAPjP and, as a minimum, include the following:

- Item/activity inspected,
- Date of inspection,
- Inspector signature,
- Type of inspection - characteristics and objectives,

- Inspection criteria employed,
- Identification of the measuring and test equipment used during inspection,
- End results or acceptability, and
- Nonconformances and dispositions of nonconformances.

TITLE: TEST CONTROL

Approved By:

5/7/91
Director, Environmental Management

TABLE OF CONTENTS

1.0 PURPOSE

This section describes the requirements and methods for test activities performed to demonstrate that the items and systems will perform satisfactorily.

2.0 APPLICABILITY

This section applies to all EM Department and subcontractor personnel involved in test planning, approval, performance, documentation, evaluation, and disposition of final test results. Examples of tests include prototype qualification tests, bench scale and/or prototype waste treatability tests, production tests, proof tests prior to installation, pre-operational tests,

and operational tests. The requirements of this section do not apply to equipment calibration, as this is addressed in Section 12.

3.0 REQUIREMENTS

3.1 Test Requirements

Test requirements and acceptance or rejection criteria, including required levels of precision and accuracy, will be provided or approved by the responsible organization in the WPs/QAAs and/or approved EG&G SOPs. Test requirements and acceptance or rejection criteria shall be based on specified requirements contained in applicable design or other pertinent technical documents.

Tests necessary to validate quality attributes of an item shall be performed in accordance with approved, documented test procedures such as the procedures for borehole packer tests documented in EG&G SOP 2.3. These procedures shall provide the following information as applicable:

- Test objectives.

- Test prerequisites, including such things as preparation and completeness of items to be tested, controlled environmental conditions, plant conditions, required system isolation and tagging requirements, and personnel training or qualifications.

- Range and accuracy requirements for calibrated measuring and test equipment, and need for special tools or materials.

- Acceptance/rejection criteria as defined in the applicable design and/or procurement documents.

- Safety precautions.

- Step by step testing instructions.

- Test monitoring requirements and mandatory inspection hold and witness points.

3.2 Test Plans

Test plans shall include test objectives and make provisions for assuring that proper instrumentation is available and is used, necessary monitoring is performed, and suitable environmental conditions are maintained to avoid degradation of the test item. Test plans shall also address:

- Instrument calibration.

- Training, qualification and certification requirements of test personnel.

- Type of measuring and test equipment required and their calibration requirements.

- Testing parameters and acceptance criteria.

- Environmental conditions.

- Potential sources of uncertainty and error.

Test plans shall be reviewed and approved in accordance with the requirements in Section 5 of this QAPjP.

3.3 Performance of Test Activities

EM Department and subcontractor personnel shall conduct test activities in accordance with the requirements identified in test plans. EM Department and subcontractor personnel shall also assure that proper environmental conditions are maintained in the requisite activities and any deviations or nonconformances that may occur during these tests are documented and dispositioned in accordance with the requirements identified in Section 15 of this QAPjP.

3.4 Test Results

Test results shall be documented and their conformance with acceptance criteria evaluated by responsible and qualified personnel in order to assure that test requirements have been met. Test records will contain as a minimum:

- Item, system, or sample tested,
- Date of test,
- Unique identification of item and test equipment,
- Type of observation,
- Tester or data recorder identification,
- Tolerance requirements or acceptance criteria,

- Results and acceptability,

- Deviations and actions taken with regard to the deviations, and

- Name of personnel evaluating results.

3.5 Quality Assurance Records

These test results are considered as QA Records and shall be maintained in accordance with the requirements in Section 17 of this QAPjP.

TITLE: CONTROL OF MEASURING AND TEST EQUIPMENT

Approved By:

5/7/91
Director, Environmental Management

TABLE OF CONTENTS

1.0 PURPOSE

This section establishes the requirements and the methods for the control of M&TE used in ER Program activities. Specific test equipment required during the conduct of ER Program activities are listed and described in the "Procedures" section of the EG&G SOPs listed in Table 3-1. The controls for analytical laboratory equipment are determined by the method of analysis, which are addressed in the GRRASP.

2.0 APPLICABILITY

The requirements are applicable to the EM Department and EM Department-subcontractors personnel whose activities involve the use of measuring and test equipment.

3.0 REQUIREMENTS

3.1 Selection

An all-inclusive system is used for the calibration and maintenance of M&TE and measurement standards. The system provides for such items to be of proper type, range, accuracy, and tolerance to accomplish the function of determining conformance to specified requirements. M&TE and measurement standards are calibrated and utilized in an environment controlled to the extent necessary to assure continued measurements of required accuracy, giving due consideration to temperature, humidity, vibration, cleanliness, and other controllable factors.

The application requirements of the M&TE and measurement standards determine the selection of the type of M&TE to be used. M&TE to be used for the determination of each major measurement parameter shall be selected such that the accuracy and precision of the M&TE meets or exceeds the accuracy and precision requirements for the parameter being measured. These requirements are detailed in Section 3 of this QAPjP, which is intended to apply to all facets of M&TE use, calibration, maintenance, etc.

3.2 Identification

M&TE is uniquely identified both on the specific item and in accompanying records. This is accomplished by physically marking the equipment with a unique identification number, status tag, color code, and/or calibration sticker that includes the M&TE unique identifier,

calibration, and calibration due date. The identifier is recorded on the data sheet, log book page, etc., along with the data recorded when using that item.

3.3 Calibration

M&TE is calibrated, adjusted, and maintained at prescribed intervals or, prior to use, against certified equipment having known valid and traceable relationships to nationally recognized standards such as the National Institute for Standards and Technology (NIST) (formerly known as National Bureau of Standards). When nationally recognized standards exist, the basis for calibration is documented. Measurement standards used in the calibration system are supported by certificates, reports, or data sheets attesting to the description or identification of the item; the calibration source; date of calibration; calibration assigned value; statement of uncertainty; and environmental or other conditions under which the calibration results were obtained.

The standardization/calibration of *in situ* monitoring equipment and field test probes and kits will be completed according to manufacturer's specifications and at frequencies specified in specific OU WPs or, for field M&TE, at the minimum frequency and acceptance criteria specified in Table 12-1. In addition to the field instruments listed in Table 12-1, photoionization detectors (PID), flame ionization detectors (FID), and gas chromatographs (GC) will be used for field gas sampling. The calibration, use, and maintenance of PIDs, FIDs, and GCs depends on the specific type of instrument being used and, therefore, will be done according to the manufacturers instructions.

A Calibration Log shall be maintained for field instruments and all calibrations shall be documented in the log (see the "Forms" section of SOPs 1.15, 2.5, and 4.1 for examples of calibration documentation). Calibration stickers may also be used to indicate calibration status. M&TE calibration documentation includes the following information as a minimum:

TABLE 12-1
Calibration/Standardization Frequencies and
Minimum Acceptance Criteria for Field Measurements

Field Instrument	Parameter	Frequency of stand./calib.	Procedure	Acceptance Criteria
pH Meter	pH	Each well	Calibrate	Standard Value ± 0.2 pH units
Conductivity Meter	Specific Conductance	Each well	Calibrate	Standard Value ± 10%
Mercury Thermometer or Thermistor	Temperature	Weekly	Calibrate[a]	± 1.0°C (difference between measured value and NBS calibrated thermometer or thermometer calibrated against an NBS traceable thermometer)
Membrane Electrode Sensor	Dissolved Oxygen	Each well	Calibrate	Standard Value ± 10%
Spectrophotometer	Dissolved Oxygen	Each sample	Zero instrument Baseline[b]	0.0 mg/l
HACH digital titrator	Total Alkalinity	Each new lot of titrant	Standardize	Standard Value ± 10%
Spectro-photometer	Nitrate/Nitrite as N	Each sample	Zero instrument Baseline[b]	0.0 mg/L
		Each lot	Determine Reagent Blank Value on each new lot of nitraver 5 ampuls	< 1.0 mg/l
		Each lot	Standardize each new lot of nitraver 5 ampuls[c]	Standard Value ± 10%
Spectro-photometer	Turbidity	Each sample	Zero Instrument Baseline[b]	0 FTUs
		Each new lot of calibration reagent	Check standard solution	± 2 FTUs

[a] Instruments that will be utilized to measure temperature sensitive parameters (pH, specific conductance, and D.O.) will also require weekly calibration or standardization if they are utilized to measure temperature to adjust the associated temperature sensitive parameter value.

Some of these instruments may allow for actual field calibration while others will not be capable of temperature adjustment and may therefore only be standardized. Instruments which allow for actual field calibration will be calibrated weekly. Instruments that do not allow for calibration will be standardized. If the standardization is outside the acceptance limits, the instrument should be returned to the manufacturer for maintenance and repair.

[b] A chemically untreated portion of the sample will be used as a blank to establish a zero level for the parameter prior to measurement of the chemically treated sample.

[c] Follow manufacturer's recommendations for standardizing the reagent lots, to be utilized for field measurements.

- Unique identification of the M&TE (e.g., serial #12345).
- Description of the item (e.g., Digital Multimeter, model #999X).
- Frequency of Calibration (e.g., every 6 months).
- Date of last calibration.
- Date of next calibration.
- Traceability information (e.g., Traceable to NIST voltage standard ser.# 295123, Traceable to ASTM standard methodology for Sulfur Dioxide spike samples-ASTM-6543-1976).
- Calibration Procedure (e.g., SOP#CP-999Z-Rev.1, Fluke Multimeter Calibration Procedure for model 999X dated 7/4/90).
- Preventive Maintenance Schedule (e.g., any major preventative maintenance may be concurrent with calibration schedule).

3.4 Calibration Procedures

Written procedures are utilized for the calibration of all M&TE and measurement standards. The calibration procedures for M&TE required for the implementation of an SOP are described in the "Procedures" section of that particular SOP. For example, the calibration procedures for the field instruments listed in Table 12-1 are described in SOP 2.5, Measurement of Groundwater Field Parameters. Since the use of M&TE is SOP-specific, the calibration procedures are described within the SOP rather than in this QAPjP. Calibration procedures described in the SOPs specify the measurement standards and

equipment to be used; the required parameter, range, and accuracy of the measurement standard; and the acceptable tolerance of each instrument characteristic being calibrated. At a minimum each calibration procedure includes the following:

- Reference to EPA-approved or other validated, standard methods.
- Specific acceptance criteria for all calibration measurements.
- Description of non-standard or modified methods and references to support these methods.
- Description of calibration frequency.
- List of any critical spare parts that may be required for calibration purposes.

3.5 Preventive Maintenance Procedures and Schedules

Preventive maintenance for M&TE is implemented according to manufacturer's instructions, or according to specific requirements stated within the "Procedures" section of a particular SOP. An example of maintenance procedures and schedules for M&TE to be used in ER Program activities is described in SOP 4.4, Discharge Measurement, for vertical axis current meters. Critical spare parts listed in the manufacturer's preventive maintenance procedures will be maintained by those responsible for the instrument/equipment.

A tracking system is utilized to provide for a maintenance schedule of M&TE and measurement standards to assure timely maintenance, thereby precluding use of an instrument beyond its maintenance due date. Prior to use of M&TE, personnel verify that the maintenance due date has not expired. If the maintenance due date has expired, the item

shall be tagged and segregated if possible, and a Nonconformance Report prepared in accordance with Section 15 of this QAPjP.

3.6 Nonconformance

If any M&TE or measurement standard is found to be significantly out-of-tolerance during the calibration process, the calibration system shall provide for the notification to the respective user and the QAPM of the out-of-tolerance condition with associated measurement data so that appropriate action can be taken.

3.7 Handling and Storage

Proper protection, storage, handling, and environmental conditions is maintained for M&TE. The effects of environmental or other factors on an item's uncertainty is considered when calibration specifications are established and appropriate protection measure taken. Limitations on the handling, use, and storage of items is defined in the applicable calibration test, and item-specific M&TE implementing procedures.

3.8 Commercial Devices

Calibration and control measures are not required, for example, with rulers, tape measures, levels, and other such devices, when normal commercial equipment provides adequate accuracy.

3.9 Quality Assurance Records

Documents generated as a result of control, use, or calibration of M&TE are considered to be QA Records, and are maintained in accordance with the requirements of Section 17 of this QAPjP. Records documenting the schedules and procedures to maintain the accuracy of

M&TE and measurement standards include individual calibration records or other means of control for each item. Such records shall provide a description or identification of the item, calibration interval, date calibrated, identification of the calibration source, calibration procedure used, calibration results, and calibration actions taken. In addition, the individual record of any item whose accuracy must be reported via a calibration certificate or report shall state the certificate or report number.

TITLE: HANDLING, STORAGE, AND SHIPPING Approved By:

5/7/91
Director, Environmental Management

TABLE OF CONTENTS

1.0 PURPOSE

This section establishes the requirements and methods for the control of packaging, handling, storage, shipping, cleaning, and preservation of items which affect quality. These requirements do not apply to handling of samples, sample chain-of-custody, or data, as these are discussed in Sections 3 and 8 of this QAPjP. The methods discussed in this section ensure that the items which affect quality are controlled to prevent damage or loss and to minimize their deterioration.

The handling, storage, and shipping of hazardous wastes are addressed in RFP RCRA Hazardous and Mixed Waste SOPs. ER Program SOPs that deal with decontamination and handling of potentially contaminated equipment, wash water, drilling fluids and cuttings, and residual core and laboratory samples are part of the EG&G Rocky Flats field operations procedures (specifically SOPs 1.3, 1.4, 1.5, 1.6, 1.7, 1.8, 1.9, 1.10, and 1.13).

2.0 APPLICABILITY

These requirements apply to all ER Program activities in which personnel handle, store, package, ship, or receive items which if damaged, lost, or deteriorated, could affect quality. Examples of items for which these requirements apply include chemical reagents for sample preservation, calibration standards, continuous data recorders, special sampling equipment, and well/borehole casings.

3.0 REQUIREMENTS

3.1 Procedures

When required for critical, sensitive, perishable, or high-value items, procedures or instructions shall be developed or referenced (where existing SOPs and/or manufacturer's instructions are applicable) for the handling, shipping, storage, packaging, and/or preservation of those items. These procedures or instructions shall include at a minimum:

- Identifying the item or category of items to be controlled.
- Referencing any applicable codes or standards.
- Indicating the degree of cleanliness, preservation, and packaging required.
- Specifying the step-by-step sequence of operations to be followed in handling, shipping, and storing the item or class of items.
- Specifying the level of experience and training required to perform the handling, storage, and shipping activities required.

- Specifying special handling tools and equipment required (e.g., cranes, lifts, slings).

- Specifying special identification or marking requirements, and the verification of these markings (markings and labeling will be established to adequately identify, maintain, and preserve the item, and specify any special controls needed).

- Specifying maximum storage and retention times (i.e., shelf life), including necessary disposal requirements.

- Specifying unique equipment requirements (e.g., containers, preservatives, temperature, etc.).

- Specifying QA audit and surveillance requirements.

3.2 Additional Requirements

Shipping documentation should accurately reflect tag and serial numbers for tagged items.

When applicable, traceability shall be maintained at all times for the items to be shipped, from the point of origination to the final receipt of the item or material. The person responsible for the use of the particular item will determine when traceability is required.

Packaging requirements will be specified for protection against corrosion, contamination, physical damage, or any effect which would affect the item or cause deterioration during handling, storage, or shipping.

3.3 Quality Assurance Records

Documents generated as a result of handling, storage, and shipping of items are considered to be QA Records, subject to the requirements identified in Section 17 of this QAPjP.

TITLE: IDENTIFICATION, INSPECTION, TEST, AND OPERATIONS

Approved By:

5/7/91
Director, Environmental Management

This is a
CONTROLLED DOCUMENT

EG&G — ROCKY FLATS PLANT
ENVIRONMENTAL MANAGEMENT DEPARTMENT

This is a RED Stamp

TABLE OF CONTENTS

1.0 PURPOSE

This section identifies the requirements and methods for use of physical status indicators (e.g., tags or markings) for items, products, systems, and equipment that have the potential to impact the quality of samples and/or data. When it is not appropriate to attach physical status indicators to items, products, systems, or equipment, the inspection, test, and operation status shall be recorded in documents (e.g., inspection records) traceable to the particular item.

2.0 APPLICABILITY

These requirements are applicable to EG&G Rocky Flats and subcontractor personnel involved in controlling the status of items products, systems, and equipment and to personnel involved in using these while performing ER Program activities. The type of activities that shall comply with these requirements and methods include, but are not limited to, receiving

inspection activities for items, products, materials, and equipment, and post-installation testing and use of environmental monitoring and testing equipment and instrumentation.

3.0 REQUIREMENTS

3.1 Status Identification

The status of inspection and test activities shall be identified either on the items or in documents traceable to the items where it is necessary to assure that required inspections and tests are performed and to assure that items which have not passed the required inspections and tests are not inadvertently installed, used, or operated. The status of nonconforming, inoperative, or malfunctioning systems and components shall be documented and identified to prevent inadvertent use.

Status shall be maintained through indicators, such as physical location and tags, markings, stamps, inspection records, or other suitable means. Physical status indicators and status documentation shall address:

- The operating status of the system or component.
- Activities which require the use of these indicators.
- Proper unique identification to provide for traceability.
- Out-of-service conditions.

The use of these indicators shall not adversely affect the characteristics or function of the item. Examples of physical status indicators include: "Do Not Operate," "Hold," "Accept," "Reject," and "Nonconforming Material."

3.2 Quality Assurance Records

Documents generated as a result of controlling test and operating status are considered QA Records and shall be controlled as specified in Section 17 of this QAPjP.

TITLE: CONTROL OF NONCONFORMANCES

Approved By:

5/7/91
Director, Environmental Management

TABLE OF CONTENTS

1.0 PURPOSE

This section defines the requirements, and methods for identifying, controlling, evaluating, and dispositioning nonconformances in items, services, samples, and data.

2.0 APPLICABILITY

These requirements are applicable to all personnel who discover, evaluate, and/or provide dispositions to nonconformances. Nonconformances in analytical laboratories are addressed in the GRRASP and are described in Section 3 of this QAPjP.

3.0 REQUIREMENTS

3.1 Definition of Nonconformance

A nonconformance consists of a deficiency in the characteristics, documentation, or procedure that renders the quality of an item or activity unacceptable or indeterminate.

3.2 Identification of Nonconformances

All EM Department and contractor personnel are responsible for the initiation of an NCR upon discovery of a nonconforming item or activity. Upon discovering a nonconformance, the initiator shall prepare an NCR (see Figure 15-1). The NCR shall identify the requirements that were violated, the actual nonconforming condition, and any immediate actions needed or taken to correct the item or activity. The NCR shall be forwarded to the QAPM for further disposition.

3.3 Segregation of Nonconforming Items, Services, Samples, and Data

Nonconforming items, samples, and data shall be segregated, when practical, by placing them in a clearly identified and designated hold area until the related NCR has been resolved. When segregation is impossible or impractical due to physical conditions, environmental conditions, size, weight, access limitations, or other such reasons, other precautions shall be taken to preclude inadvertent use of a nonconforming item, service, sample, or data. These precautions may include tagging, flagging, securing, or posting security measures. Associated records, documents, or containers shall indicate the NCR number to advise others that a nonconformance has been detected. Upon closure of the NCR, the segregation or precautionary measures are no longer required and shall be removed by the QAPM or designee.

Figure 15-1

NONCONFORMANCE REPORT

EG&G ROCKY FLATS

NCR No. _____ DATE _____
QAL _____ PAGE _____ OF _____
AUTH # _____ BLDG # _____
PROJ NCR No. _____ P.O. # _____

PROJECT: _____
RESPONSIBLE DEPARTMENT: _____
ITEM: _____ QUANITY _____
SPECIFICATION REFERENCE: _____
NONCONFORMANCE DESCRIPTION: _____

ISSUED BY: _____ DATE _____
Name Title Organization

MANAGER, CONST. MGMT. & INSPECTION _____ DATE _____

PRELIMINARY DISTRIBUTION: ☐ BLDG. MGR. ☐ MANAGER PE ☐ PROJ. ENGR. ☐ MANAGER MTCE. ☐ CM&I MASTER FILE ☐ SEISMIC QUAL. ☐ HS&E AREA ENGR. ☐ CONSTRUCTION COORDINATOR ☐ CONTRACTOR ☐ PURCHASING ☐ FIRE PROT. ENGR. ☐ OTHER

DISPOSITION: ☐ USE-AS-IS ☐ REPAIR ☐ REWORK ☐ REJECT ☐ AS-BUILT REQUIRED

DISPOSITION APPROVALS:

PROJECT ENG. _____ DATE _____ DESIGN CHECKER _____ DATE _____
HS&E AREA ENGR. _____ DATE _____ USER _____ DATE _____
PURCHASING (IF APPL.) _____ DATE _____ FIRE PROT. ENGR. _____ DATE _____
SEISMIC QUAL _____ DATE _____ FQA _____ DATE _____

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3.4 Disposition of Nonconformances

The QAPM shall assign the NCR to the responsible Division Manager(s), or shall provide the disposition for nonconformances limited to QA activities. Nonconforming characteristics shall be reviewed and recommended dispositions of nonconforming items or activities shall be proposed and approved by the responsible Division Manager and the QAPM. The disposition shall include a statement of the cause of the condition, the recommended action required to correct the nonconformance, and other applicable measures to prevent recurrence of the item or activity.

NCRs generated by the lack of adequate procedural control, or the improper or ineffective implementation of a procedure, shall receive disposition in the same manner as those involving items, services, samples, or data. Particular attention should be paid to the remedial and investigative action taken to resolve the immediate problem and determine the extent of the deficiency's impact.

Based upon the actions described in the NCR, the dispositions for nonconforming items shall be categorized as one of, or a combination of, the following:

- Use-As-Is. Use of an item, service, sample, or data will not result in an adverse condition and will continue to meet all functional requirements, including performance, maintainability, fitness for use, and safety. Technical justification for this deviation from the original requirements shall be provided in the NCR. The documents and/or records associated with the nonconformance will reflect the NCR to provide traceability to the identification and resolution of the condition.

- Rework. Actions taken will restore the item, service, sample or data to meet the original specified requirements. Reworked items are required to be retested and/or verified using the original acceptance criteria.

- Repair. Actions taken will correct the item, service, sample, or data to meet acceptable requirements, even though it did not conform with the original specified requirements. Technical justification for this deviation from the original requirements shall be provided in the NCR. The documents and/or records associated with the nonconformance shall reflect the NCR number to provide traceability to the identification and resolution of the condition.

- Reject. No actions can be taken to correct or restore the item, service, sample, or data to meet requirements. The item, service, sample, or data must be scrapped or returned to the contractor/supplier.

3.5 Approvals

The appropriate Division Manager, or delegate, shall review and approve dispositions to NCRs resolved within their Division. The QAPM, or delegate, also shall review and concur with the NCR disposition.

3.6 Tracking, Verification, and Closure

The QAPM or delegate shall track and monitor the status of open NCRs until closure. The QAPM, or delegate, shall verify the implementation and effectiveness of disposition actions prior to closure of the NCR. Verifications shall be conducted by personnel independent of the condition and actions being verified. Upon verification of implementation of the actions and the generation of the required records, the QAPM shall close the NCR and notify the responsible Division Manager(s).

3.7 Determination of Root Cause

In order to assure effective corrective action, the root cause of the problem identified in NCRs shall be identified, documented, and analyzed as part of the trend analysis system described in Section 16 of this QAPjP.

3.8 Quality Assurance Records

Documentation related to the generation, disposition, evaluation, justification, and closure of NCRs are QA Records that shall be maintained in accordance with the requirements of Section 17 of this QAPjP. The records, tags, flags, etc. used as precautionary measures to prevent inadvertent use are not QA Records and do not need to be maintained beyond the use described in this section.

TITLE: CORRECTIVE ACTION

Approved By:

5/7/91
Director, Environmental Management

TABLE OF CONTENTS

1.0 PURPOSE

This section describes the requirements and methods for identifying, documenting, and verifying corrective actions for conditions considered to be adverse to quality.

2.0 APPLICABILITY

These requirements are applicable to personnel involved in identifying corrective actions resulting from performance and system audits, surveillances, assessments, laboratory comparison studies, investigations, NCRs, unplanned events, or other activities.

3.0 REQUIREMENTS

3.1 Identification of Conditions Adverse to Quality

All EM Department and contractor personnel assigned to quality affecting projects or tasks are responsible for identifying any significant or recurring discrepancies which require correction by initiating a Corrective Action Report (CAR).

Conditions adverse to quality are conditions where operating limits, specifications, standards, or administrative control systems established by approved procedures, have not been implemented effectively and the results could have a significant impact on ER Program activities. Upon identification of a condition adverse to quality, the initiator shall prepare a CAR (see Figure 16-1). The CAR shall be forwarded to the QAPM for disposition.

3.2 Responding to CARs

The QAPM shall coordinate with the EM Department Director to assign the CAR to the responsible Division Managers or Department Director for response, or the QAPM shall provide a response for CARs limited to QA activities.

Response actions should be commensurate with the type, importance, complexity, priority, and health and safety of the public and EM Department personnel. CAR responses shall provide the following, as applicable:

- Investigative action(s) to determine the scope or extent of the condition.
- Root cause(s) of the problem(s).
- Action(s) to correct the specific problem(s).

Figure 16-1

ER PROJECT CORRECTIVE ACTION REPORT

ORIGINATION

1. CAR No. RFP-ER-CAR-____ AUDIT/SURVEILLANCE No. ____ SEVERITY LEVEL ____ Page ____ of ____

2. Checklist Reference	3. Responsible Organization	4. Identified by (Originator)

5. Personnel Contacted During Audit/Surveillance/Other

6. Requirement:

7. Deficiency (Description):

8. Discussion and Recommended Action(s):

9a. Originator Signature/Date:	9b. QA Officer Signature/Date:	10. Response Due Date:

RESPONSE

11a. Cause:

11b. Remedial/Investigative Action(s): 11c. Scheduled Implementation Date ____

11d. Action(s) to Prevent Recurrence: 11e. Scheduled Implementation Date ____

12. Name, Title	Signature	Date

EVALUATION

13. RESPONSE ____ Accept ____ Amend ____ Reject	ATL/STL/Date	QA Officer/Date

14. CORRECTIVE ACTIONS COMPLETED
Implementor Signature/Date

15. AMENDED RESPONSE ____ Accept ____ Reject	ATL/STL/Date	QA Officer/Date

16a. VERIFICATION ____ Satisfactory ____ Unsatisfactory

16b. REMARKS

REF. AUDIT/SURVEILLANCE No.	ATL/STL/Date	QA Officer/Date

17. DATE OF CAR CLOSURE

- Action(s) taken for similar or related conditions.

- Action(s) taken to eliminate root cause(s) and preclude recurrence.

- Schedule for completion of action(s).

3.3 Evaluation and Closure of CARs

The QAPM, or delegate, shall evaluate responses to CARs to assure that requirements, specific deficiencies, and actions taken to prevent recurrence have been addressed. Upon approval of the proposed response and completion of scheduled action(s), the QAPM shall verify the implementation and effectiveness of the corrective action(s). For audit findings, the QAPM will assure that the lead auditor/team leader is involved in the evaluation of the response and verification of the action(s).

Following satisfactory verification of implementation, the QAPM shall close the CAR and notify the responsible Division Manager(s) or Department Director(s). Unsatisfactory verifications shall result in the issuance of a new or revised CAR to describe the adverse condition.

The QAPM shall track and monitor the status of open CARs to assure timely resolution and closure.

3.4 Trend Analysis

The QAPM shall establish a trend analysis program that identifies the overall trends of the ER Program. The program shall include analysis of CARs and NCRs, analysis of open and closure rates, and root cause analysis, and will identify positive and negative trends. Trend

analysis reports will be issued periodically, to the EM Department Director, with additional distribution to appropriate Division Managers.

3.5 Quality Assurance Records

Documentation associated with generation, evaluation, closure, and analysis of CARs and Trend Analysis Reports are QA Records that shall be maintained in accordance with Section 17 of this QAPjP.

TITLE: QUALITY ASSURANCE RECORDS

Approved By:

5/7/91
Director, Environmental Management

TABLE OF CONTENTS

1.0 PURPOSE

This section establishes the requirements and methods for the generation, control, validation, maintenance, and disposition of QA Records that are a result of ER Program activities.

2.0 APPLICABILITY

These requirements are applicable to activities which generate, process, or verify documents and records supporting quality-affecting activities and site investigations. The terms "records" and

"documents" used throughout this section are to be interpreted as QA Records. QA Records are completed documents that furnish evidence of the quality of items and/or activities affecting quality. QA records shall include, but are not necessarily limited to: (1) individual documents that furnish evidence of the quality and completeness of the RI/RFI and Feasibility Study/Corrective Measures Study (FS/CMS) process, including field data collection forms, laboratory data reports, chain of custody forms, calibration records, field activity reports, etc.; (2) documents that demonstrate implementation of QA programs, such as audits, surveillances, assessments, and reviews; (3) procurement documents; (4) WP, QA plans (including this QAPjP and QAAs), SOPs, and SOPAs; and (5) other materials that affect data and document quality such as maps, magnetic media, photographs, log books, etc.

3.0 REQUIREMENTS

3.1 Records System

The EM Department Records Custodian, to be appointed by the Department Director, shall organize and implement a records system for the receipt and control of QA records for environmental restoration. The records system established will be able to collect, maintain, and protect QA Records to provide evidence of ER Program compliance with governing requirements. The EM Department records center will be established on-site at EG&G Rocky Flats' offices. The records system shall provide for the storage and maintenance of QA Records and will be staffed by records management personnel.

Records shall be accepted by records management personnel when they are identified as QA Records. Records and/or indexing systems(s) shall provide sufficient information to permit identification between the record and the item(s) or activity(ies) to which it applies. Documents which are clearly marked as "Preliminary Draft" (working draft prior to review and approval) or "Information Copy" (uncontrolled copy) are not QA Records.

3.2 Generation of Records

QA Records resulting from implementation of this QAPjP, SOPs, site specific WPs, QAAs, and SOPAs, and other project documents shall be submitted to the QA Records Custodian for handling. QA Records shall be submitted to the QA Records Custodian within 30 days of completion.

3.3 Record Authentication

Documents shall be considered authenticated only if stamped, initialed or signed, and dated, or other approved methods. Authentication may take the form of a statement by the responsible individual or organization. Authentication may occur at the time of issuance of the record or prior to transmittal to records management personnel.

3.4 Record Quality

QA Records must be legible, identifiable, complete, authenticated, and of microfilmable quality. Records may be originals or quality acceptable reproduced copies. Permanent ink shall be used on all documents which are to become QA Records.

3.5 Record Index and Classification

Records management personnel shall generate a records index which identifies the record type to be produced on the project, the unique identifier, the record retention time, and the location of the record within the record system. Records management personnel and/or EM Department supervision will classify records as to their retention status (i.e., lifetime/permanent records, nonpermanent records, and records with limited storage and retention requirements).

3.6 Record Revisions or Corrections

Management shall decide and list those persons authorized to change or correct information on documents that have been designated as QA Records. The methods to be used (by authorized persons only) for correcting QA Records are as follows:

- Corrections to QA Records: Corrections shall be made by scribing a single black line through the incorrect information and entering the correct information in close proximity to the lineout. The correction shall include the date and initials of the person who made the correction.

- Regeneration of QA Records: The record management personnel or person generating a record will inform the QAPM that a QA Record has been lost or damaged beyond repair. The QAPM will provide guidance as to the method for regeneration or replacement of the record. (See ANSI/ASME NQA-1-1989, Supplement 17S-1 for guidance.)

3.7 Records Receipt, Storage, Preservation, and Safekeeping

A system shall be identified for receipt control of records by the records management personnel for permanent and temporary storage. This system shall include:

- A method for designating the required records.

- A method for identifying the records received.

- Procedures for receipt, inspection, and acceptance of incoming records.

- A method for submittal of completed records to the storage facility(ies) without undue delay.

Records shall be stored in a manner that protects them against damage from moisture, temperature, pressure, larceny, rodents, sunlight, and other environmental considerations until submitted to the record storage facility(ies). The record storage facility(ies) shall be constructed in a manner that minimizes the risk of damage or destruction. See ANSI/ASME NQA-1-1989, Supplement 17S-1 for facility storage options. Single or dual storage may be utilized, as long as measures are taken to provide for replacement, restoration, or substitution of lost or damaged records. A list shall be maintained designating those personnel who will have direct access to the QA Record files in the record storage facility(ies).

3.8 Retention of Records and Documents (Interagency Agreement Part 38)

Documents and records that relate in any way to the presence of hazardous substances, pollutants, or contaminants at the RFP, or to the implementation of the IAG, shall be classified as lifetime records to be retained for the life of ER activities, and at a minimum will be preserved for 10 years after termination of the IAG. This includes all documents identified as being in the possession of the DOE or its divisions, employees, agents, accountants, or contractors. After the minimum 10-year period, DOE shall notify the EPA and the State of Colorado at least 45 days prior to destruction or disposal of any such documents or records. EPA and the State of Colorado will make a determination if the documents should be retained for a longer period of time.

TITLE: QUALITY VERIFICATIONS

Approved By:

5/2/91
Director, Environmental Management

TABLE OF CONTENTS

1.0 PURPOSE

This section establishes the requirements and methods for conducting quality verifications to determine the adequacy and effectiveness of an operation, task, process, or activity.

2.0 APPLICABILITY

These requirements are applicable to personnel performing verification activities, including audits, surveillances, assessments, reviews, and other methods of evaluating quality activities. They do not apply to inspections. Personnel selected for verifications shall be independent of the activities being evaluated.

3.0 REQUIREMENTS

3.1 Audits

Audits shall be conducted to verify compliance of the QA Program with regulatory requirements. Audits shall include review of this QAPjP and the procedures which implement it. The QAPM, or delegate, shall develop a comprehensive audit schedule to provide audit coverage of ER Program activities, the frequency of which will be commensurate with the importance and complexity of the activities.

3.1.1 Personnel Selection and Training

Auditors shall have training and experience commensurate with the scope and complexity of the activities to be evaluated and shall have training, qualifications and certification (per ANSI/ASME NQA-1-1989) for conducting audits. Personnel identified as lead auditors or audit team leaders shall be certified to perform these activities. The QAPM shall provide specific requirements and methods for training, qualifying, and certifying audit personnel.

3.1.2 Audit Preparation

The QAPM shall assure that the selected auditors complete the necessary preparation activities including:

- Notice of Audit: The appropriate organization, manager, or director shall be notified prior to commencement of the audit. This will be accomplished by written notice. EG&G retains the right to conduct unscheduled and unannounced audits.

- Development of Audit Plans: The plans shall identify the audit scope, applicable governing requirements and documents, activities to be audited, personnel or organization(s) to be notified, and a tentative schedule.

- Development of Audit Checklists: The checklists include the specific requirements to be verified and for documenting the results of the verification.

- Instruction of Personnel: The lead auditor/team leader shall assure that audit personnel have completed appropriate instruction and are familiar with the requirements for the audit.

3.1.3 Audit Reporting and Corrective Actions

Audit reports shall include the following as a minimum:

- Description of the audit scope.

- Identification of the auditors.

- Identification of personnel contacted during the audit activities.

- Summary of audit results, including a list of deficiencies and a statement on the effectiveness of the quality assurance program elements that were audited.

- Suggestive corrective action(s), where applicable, and recommendations for improvement where possible.

- Description of each reported or nonconforming condition in sufficient detail to identify the applicable NCRs or CARs generated in accordance with Sections 15 or 16 of this QAPjP. Conditions requiring prompt corrective action shall be reported immediately to Division Managers, Department Directors, or organization officers, as appropriate.

3.1.4 Performance and System Audits and Frequency

Field operations and laboratory analysis activities related to EM Department conduct of RFI/CMS investigations are subject to system and performance audits to ensure that field and laboratory procedural mechanisms are operative, conform to project requirements, and are effectively implemented in compliance with the IAG and DOE orders. A system audit consists of evaluation of all components of the measurement system, including sampling, analysis, and reporting. The system audit will objectively examine each part of the measurement system to determine deviations from required SOPs or recommended practice. The systems audit will assess such items as equipment, personnel, qualifications, sampling, analysis, quality control checks, data validation, and reporting. Performance audits are independent checks made to evaluate the quality of an item or data produced by the system. Performance audits typically assess the results and do not usually examine the intermediate steps conducted to achieve the results. An example of a performance audit would be validating the calibration accuracy of an instrument by analyzing a sample with a known

concentration of an analyte. The systems audit is more qualitative than the performance audit.

The type and frequency of system and performance audits shall be established by the QAPM and submitted to the EM Department Director. Audit schedules and frequencies shall be based on the schedule of activities presented in the site or activity specific workplans. At a minimum, performance and system audits shall be conducted at the frequencies discussed in the following sections. Written audit reports shall be submitted to:

- EG&G Rocky Flats EM Department Director
- RPD Manager
- Appropriate Division Managers
- QAPM

3.1.5 Field Operations Audits and Frequency

At least one independent (external) performance audit shall be conducted during:

- Activities to describe the nature and extent of contamination (IAG Section VI.B.3).

- Activities to evaluate site characteristics (IAG Section VI.B.4).

At least annually, internal system audits shall be conducted regarding Data Management Procedures in accordance with IAG Section VI.B.5. At a minimum, information gathered during each characterization shall be audited for consistency and adequacy of record by examination of field logs for accordance with methods described in the WP/QAA. Field logs will be audited for use in documenting observations, measurements, and significant events that occurred during field activities. Additional audits of field activities may be scheduled at

the discretion of the EM Department Director, Division Managers, or the QAPM. Surveillance may be utilized as a performance audit to verify that corrective action has been taken and effectively implemented. Written reports shall be prepared for external and internal audits and surveillances of field activities.

3.1.6 Laboratory Audits and Frequency

At least one independent system audit shall be performed by EG&G, or delegate, on an annual basis for each laboratory analyzing ER Program samples. Laboratory reports used to describe the nature and extent of contamination, and to evaluate site characteristics, shall document sample custody, analytical responsibility, analytical results, adherence to prescribed protocols, nonconformity event, corrective measures, and/or data deficiencies. Field reports, sample shipment records, and analytical results shall be audited to ensure that they maintain sample management and tracking so that only validated analytical data are reported and utilized in the development and evaluation of corrective/remedial alternatives.

Written reports shall be prepared for laboratory audits conducted in accordance with the following procedures:

- EG&G Rocky Flats, Procedures for Conducting Organic Laboratory Audits.
- EG&G Rocky Flats, Procedures for Conducting Inorganic Laboratory Audits.
- EG&G Rocky Flats, Procedures for Conducting Radiochemistry Laboratory Audits.

In addition, in compliance with the IAG, annual performance audits shall be conducted to ensure that:

- Laboratories used for analyses participate in a QA Program equivalent to that of, and approved by, the EPA, as required in Part 33, Section 195.E of the IAG.

- Analyses of data collected for each site's characterization meet the DQOs developed in the WP/QAA (or revised during the RFI/CMS) as required in Section VI.B.4 of the IAG.

Audits are considered closed upon satisfactory correction of deficiencies identified by the audit. Verification of audit closing shall be confirmed by the QAPM. Notification of audit closure shall be prepared by the team leader or lead auditor, confirmed by the QAPM, and issued to the appropriate organization, Division Manager, or Department Director.

3.2 Surveillances

Surveillances shall be conducted to directly observe items and activities for compliance with QA Program requirements. The QAPM, or delegate, shall develop a surveillance schedule to provide coverage of ongoing ER Program activities. Surveillances are intended to supplement audit verifications. Many instances occur where real-time observations of ER Program activities are required. Schedules are not required for surveillances performed under strict time constraints.

3.2.1 Personnel Selection and Training

Designated surveillance personnel shall have training and experience commensurate with the scope and complexity of the activities to be evaluated. The QAPM shall provide specific requirements and methods for training, qualifying, and, if deemed appropriate, certifying surveillance personnel.

3.2.2 Surveillance Preparation

The QAPM shall assure that the selected surveillance personnel complete the necessary preparation activities including:

- Notice of Surveillance. The appropriate organization, manager, or director shall be notified prior to or at commencement of the surveillance. This can be accomplished by telephone notice or by letter/memorandum providing written notice.

- Development of Surveillance Plans. The plans may identify the surveillance, scope, applicable governing requirements and documents, activities to be verified, personnel or organizations to be notified, and a tentative schedule.

- Development of Surveillance Checklists. The checklists may include the specific requirements to be verified and may provide for documenting the results of the verification. Checklists are not required for surveillances. If used, they should meet audit guidelines.

- Instruction of Personnel. The QAPM or surveillance team leader shall assure that surveillance personnel have completed appropriate instruction and are familiar with the requirements of the surveillance.

3.2.3 Reporting and Corrective Actions

Surveillance reports will be written in a format that provides the most appropriate information to the target audience. Executive summaries will be provided to the maximum extent practical and as appropriate to the situation. The reports shall include the following, as a minimum:

- Description of surveillance scope.

- Identification of surveillance personnel.

- Identification of personnel contacted during the surveillance.

- Summary of results, including a statement of effectiveness of the activities that were evaluated.

- Description of each reported adverse or nonconforming condition in sufficient detail to identify the applicable NCRs or CARs generated in accordance with Sections 15 or 16 of this QAPjP. Conditions requiring prompt corrective action(s) shall be reported immediately to the responsible director, manager, or organization officer.

Surveillances are considered closed upon correction of deficiencies identified by the surveillances. Notification of surveillance closure shall be prepared by the designated surveillance personnel or team leader, confirmed by the QAPM, and issued to the appropriate organization officer, Division Manager, or Department Director.

3.3 Reviews

Reviews to assure quality may include peer reviews, technical reviews, or design reviews. Reviews are conducted as required by applicable requirements governing the preparation and issue of documents, or as directed by the QAPM, Department Director, or Division Manager(s).

3.3.1 Selection of Reviewers

Reviewers shall be selected based upon acknowledged qualifications and expertise in the subject matter to be verified. When deemed appropriate, reviewers will receive instruction in preparing, conducting, and documenting reviews.

3.3.2 Reporting and Resolution of Review Comments

Prior to initiating the review, review criteria shall be identified. The review results shall be recorded on records accompanying the document being evaluated.

Review comments shall be categorized to indicate technical or editorial significance, and proposed resolution. The comments will be returned to the organization, Division, or Department responsible for the document being evaluated for action to accept or reject the comments. Disputed comments shall be resolved by the appropriate Division Manager, the QAPM, or the EM Department Director.

3.4 Management Assessments

The overall adequacy and effectiveness of the ER QA Program shall be determined by conducting assessments of each Division or the EM Department on an annual basis. Contracted or internal organizations performing management assessments shall be required to provide assessment reports to the appropriate Division Manager(s), the EM Department Director, and the QAPM.

The management assessments shall consider the following:

- Effectiveness of controls that achieve and assure quality.

- Adequacy of resources and personnel provided to the QA Program.

- Adequacy of personnel training.

The most common methods of performing management assessments are:

- Review of management reports (status reports, technical reports, etc.).

- Review of quality verification reports (audit reports, surveillance reports, inspection reports, test reports, etc.).

- Review of corrective action reports including trend analysis reports on a regular basis.

- Interviews.

3.5 Quality Assurance Records

Documentation related to quality verification activities, as described in this section, are QA Records that shall be maintained in accordance with the requirements of Section 17 of this QAPjP.

TITLE: SOFTWARE QUALITY ASSURANCE

Approved By:

5/2/91
Director, Environmental Management

TABLE OF CONTENTS

1.0 PURPOSE

This section defines the requirements and methods for the control and documentation of computer software utilized for ER Program activities.

2.0 APPLICABILITY

This section applies to computer software used by the EM Department or subcontractors to produce or manipulate data that is reported to state or federal regulatory agencies. Specific details for the implementation of the requirements contained in this section are contained in EM Department software control procedures. The extent to which these requirements apply is related to the nature, complexity, and importance of the software application.

3.0 REQUIREMENTS

Computer software will be developed, controlled, and maintained to reduce the likelihood of defects entering executable codes during development, modification, and operation, and to ensure that the end product satisfies the requirements of its intended application. Software shall be verified, validated, and documented consistent with the nature, complexity, and its intended application.

3.1 Software Development

Software development shall be accomplished in a traceable, planned, and orderly manner. The number of phases and relative emphasis placed on each phase of software development will depend on the nature and complexity of the software. Software development may be performed in an iterative or sequential manner.

3.1.1 Requirements

During this phase, the requirements that the software must satisfy that pertain to functionality, performance, design constraints, attributes, and external interfaces shall be specified, documented, and reviewed. These requirements shall define the response of the software to input data, and shall provide the detail and information necessary to design the software. The requirements shall be approved by the appropriate level of management as described in written procedures.

3.1.2 Design

During this phase, a software design based on the requirements will be developed, documented, reviewed, and approved. The design shall specify the overall structure (control and data flow), and the reduction of the overall structure into physical solutions (algorithms, equations, control logic, and data structures).

3.1.3 Implementation

During this phase, the design shall be translated into a programming language, and the implemented software shall be analyzed to identify and correct errors. Implementation phase software verification activities shall consist of the examination of source code listings to assure adherence to internal coding standards and conventions.

3.1.4 Testing

During this phase, the design as implemented in code shall be exercised by executing the test cases. Failure to successfully execute the test cases shall be reviewed to determine if modifications of the requirements, design, implementation, or test plans and test cases are required. The code shall not be used until the cause is found.

Testing phase activities shall consist of the validation of the code to assure adherence to the requirements, and to assure that the software produces correct results for the test cases. To evaluate technical adequacy, the software test case results can be compared to results from alternative methods, such as:

- Analysis without computer assistance.
- Other validated computer programs.
- Experiments and tests.
- Standard problems with known solutions.
- Confirmed published data and correlations.

3.1.5 Installation and Checkout

During this phase, the software becomes part of a system incorporating applicable software components, hardware, and data. The process of integrating the software with applicable components may consist of installing hardware, installing the program, and verifying that all components have been included. Installation and checkout phase software verification and validation activities shall consist of:

(a.) The execution of tests for installation and integration; and

(b.) The documentation of the approval of the software for operational use.

3.2 Commercial Software

Where commercial "off-the-shelf" software is used, including codes available in the public domain, it shall be placed under the configuration controls required by this section prior to use. Available documentation from the software supplier shall be obtained in order to evaluate the software's adequacy. Examples of this type of software include mathematical/numerical data reduction software, models, data management software, computer language compilers, etc. Source code is generally not available and controls are limited to unique version identification and user-related manuals for such software. Documented validation is required to demonstrate that the software performs its stated capabilities and functions.

3.3 Acquired Software

"Acquired Software" is non-commercial software acquired from organizations outside the EM Department. Software which has not been developed or originated by the EM Department, and is not commercially available, requires documented validation to demonstrate that the software performs its stated capabilities and functions. EM Department or subcontractor personnel shall test the software in accordance with written test plans to validate the software. The specific form of the test plan is up to the tester but must identify the software options to be tested, the data to be used as input, the expected results, and the acceptance criteria.

3.4 Software Verification and Model Validation

The results of software verification and model validation activities shall be documented. Software verification and model validation shall be performed by individuals other than those who designed the software.

3.4.1 Software Verification

Software verification activities shall:

(a) Ensure that the software adequately and correctly performs all intended functions, and

(b) Ensure that the software does not perform any unintended function that either by itself or in combination with other functions can degrade the entire system.

Software verification and validation activities shall be planned and performed for each system configuration which may impact the software.

Software verification shall be performed during the software development to ensure that the products of a given cycle phase fulfill the requirements of the previous phase or phases.

3.4.2 Software Validation

Computer models shall be validated. Model validation activities shall be performed to demonstrate that models, as embodied in computer software, are correct representations of the process or system for which they are intended. Model validation demonstrations are commonly achieved by comparing data produced by the model with data taken from the real world process or system. The latter data might be laboratory experimental data, field experimental data, raw field observations, or in situ testing data. Specific sets of data used in the validation process shall be identified and justification shall be made for their use.

When data are not available from the sources mentioned above, alternative approaches used shall be documented. Alternative approaches may include peer review and comparisons with

the results of similar analysis performed with other validated models and verified software. The results of model validation shall be documented as QA Records.

3.5 Software Configuration Control

3.5.1 Configuration Identification

A configuration baseline shall be defined at the completion of the software development. Approved changes created subsequent to a baseline shall be added to the baseline. A baseline shall define the most recent approved software configuration.

3.5.2 Configuration Change Control

Changes to software shall be formally documented. This documentation shall contain a description of the change, the rationale for the change, and the identification of affected baselines. The change shall be formally evaluated and approved by the organization responsible for the original design, unless an alternate organization has been given the authority to approve the changes. Only authorized changes shall be made to software baselines.

3.6 Software Documentation

Software documentation shall be maintained as a QA record as discussed in Section 17 of this QAPjP. Such documentation shall include:

- Software requirements.
- Software design documentation.

- Software change documentation.
- Description of mathematical models and numerical methods.
- Software verification documents.
- Model validation documentation.
- Software configuration management documentation.
- User's instructions or manual.

3.7 Software Application Control

Application control (the control of how an application is run) shall be implemented for software runs performed to generate or process data to develop conclusions that are to be reported to regulatory agencies. The requirements for software application control will be contained in written procedures which will be developed by the end function responsible for performing the analysis prior to the application's use. The purpose is to assure that configuration managed software is applied under the conditions specified in verification and validation documents.

3.8 Software Security

Access to computer software and computer-based data shall be controlled to prevent possible accidental or malicious misuse, modification, or disclosure.

3.9 Software Deficiencies

Deficiencies in software shall be documented on the NCR and dispositioned in accordance with Section 15 of this QAPjP. Software users will be notified of deficiencies found in software so they may determine any impact on previously reported results or conclusions.

3.10 Quality Assurance Records

The documentation requirements identified in this section and referenced EM Department software control procedures constitute QA Records and shall be maintained in accordance with the requirements identified in Section 17 of this QAPjP.

The QAA shall specify the applicable QA Records to be maintained in accordance with the requirements identified in Section 17 of this QAPjP.

TITLE: APPENDIX A

Approved By:

Director, Environmental Management 5/2/91

APPENDIX A

DATA QUALITY OBJECTIVE DEVELOPMENT PROCESS

Data quality objectives (DQOs) are developed through a three-stage process, as shown in Figure A1.1. Although the three stages are discussed sequentially in the following subsections, they should be performed in an interactive and iterative manner. The DQO process is integrated with development of the Sampling and Analysis Plan included in the specific work plan and should be revised based on the results of each data collection activity. Figure A1.2 illustrates integration of the three-stage DQO process into the planning for a phased Remedial Investigations/Feasibility Studies (RI/FS), as an example.

STAGE 1 - IDENTIFY DECISION TYPES

The major elements of Stage 1 include:

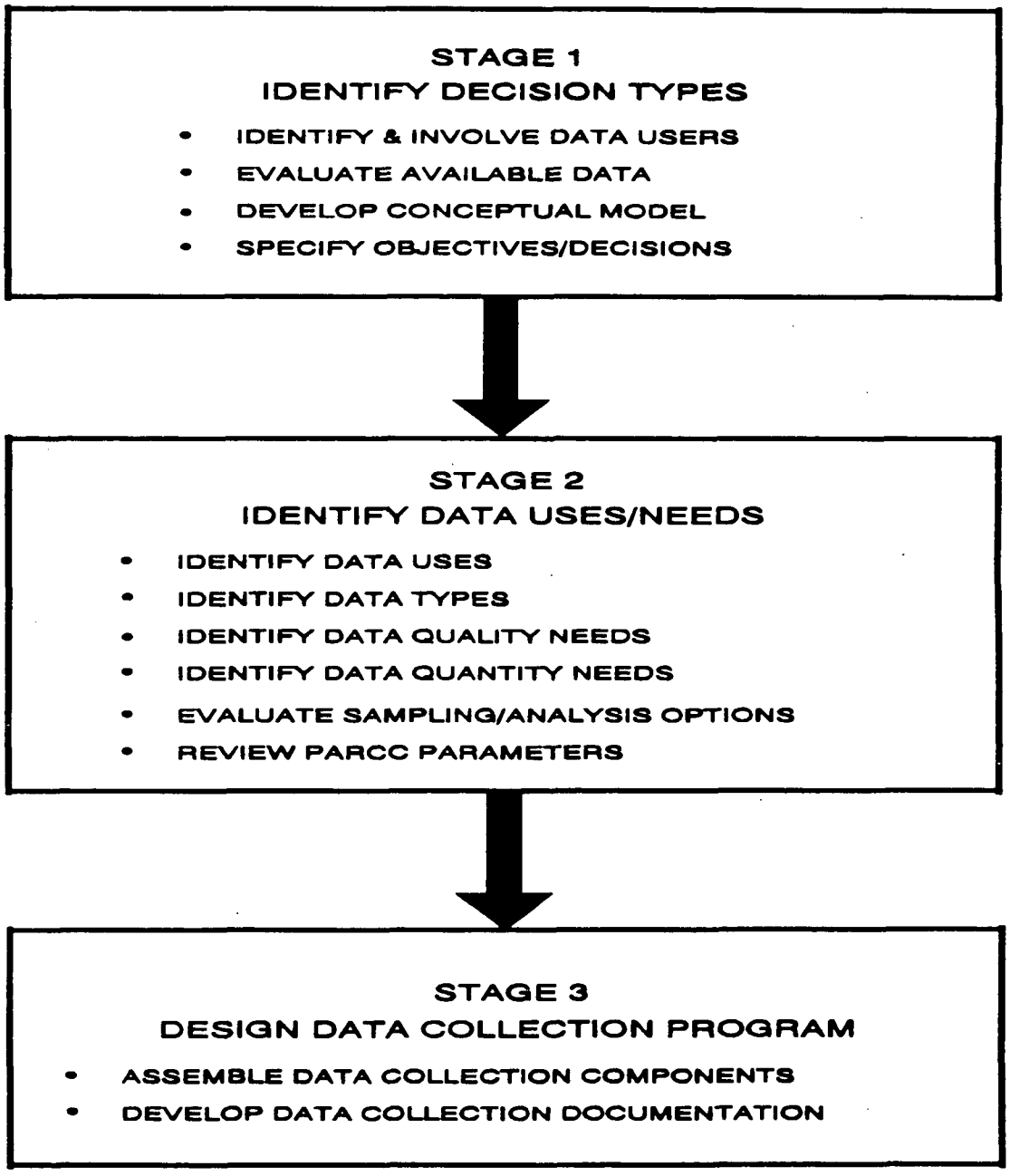
- Identifying and involving data users.
- Evaluating available data.
- Developing a conceptual model.
- Specifying objectives and decisions.

Figure A1.3 shows the Stage 1 elements.

DATA USERS

The data users for Rocky Flats ER activities consist of decision-makers, program management staff, and technical personnel. These users are described below:

Figure A1.1
DQO DEVELOPMENT STAGES



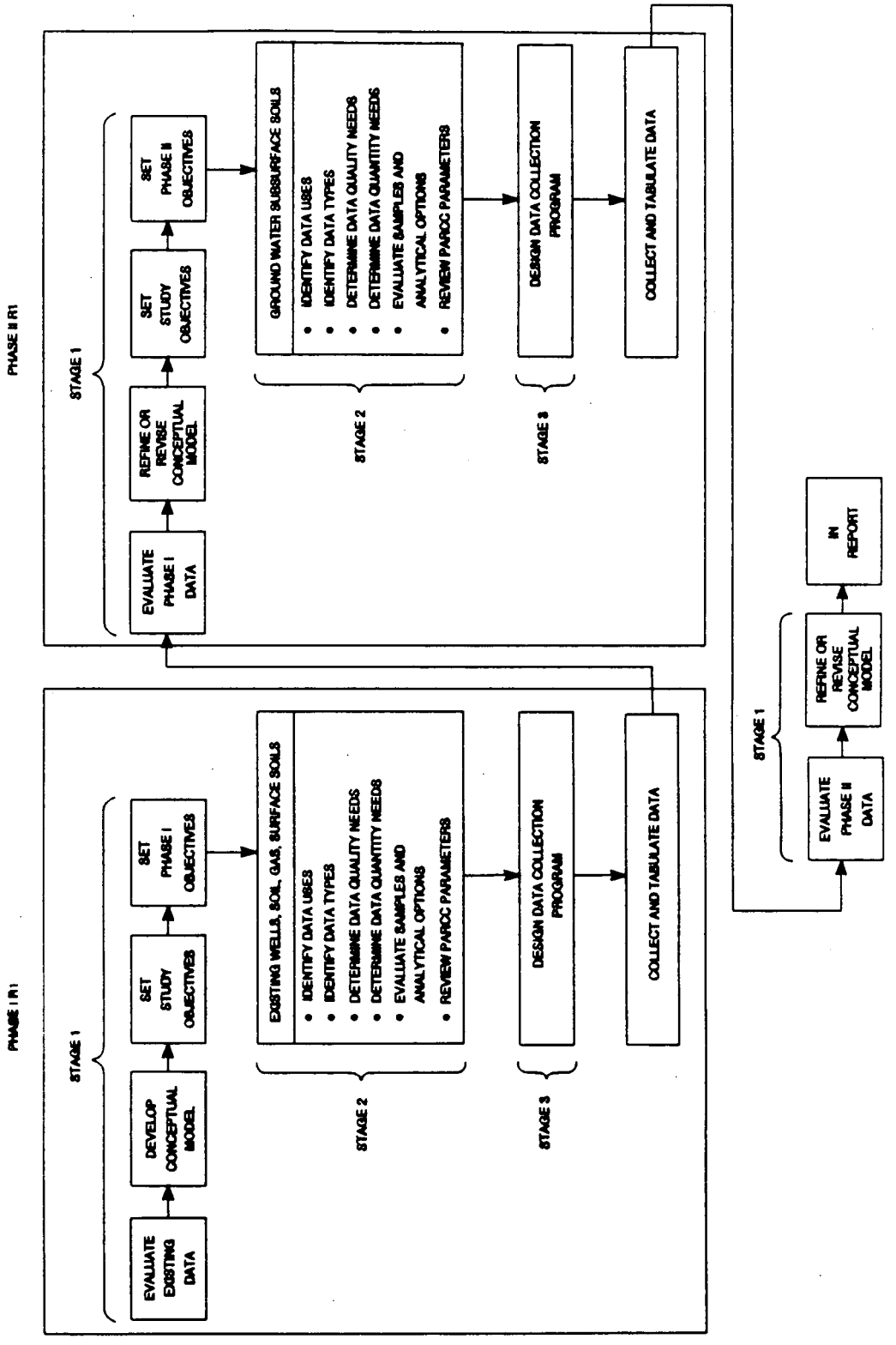
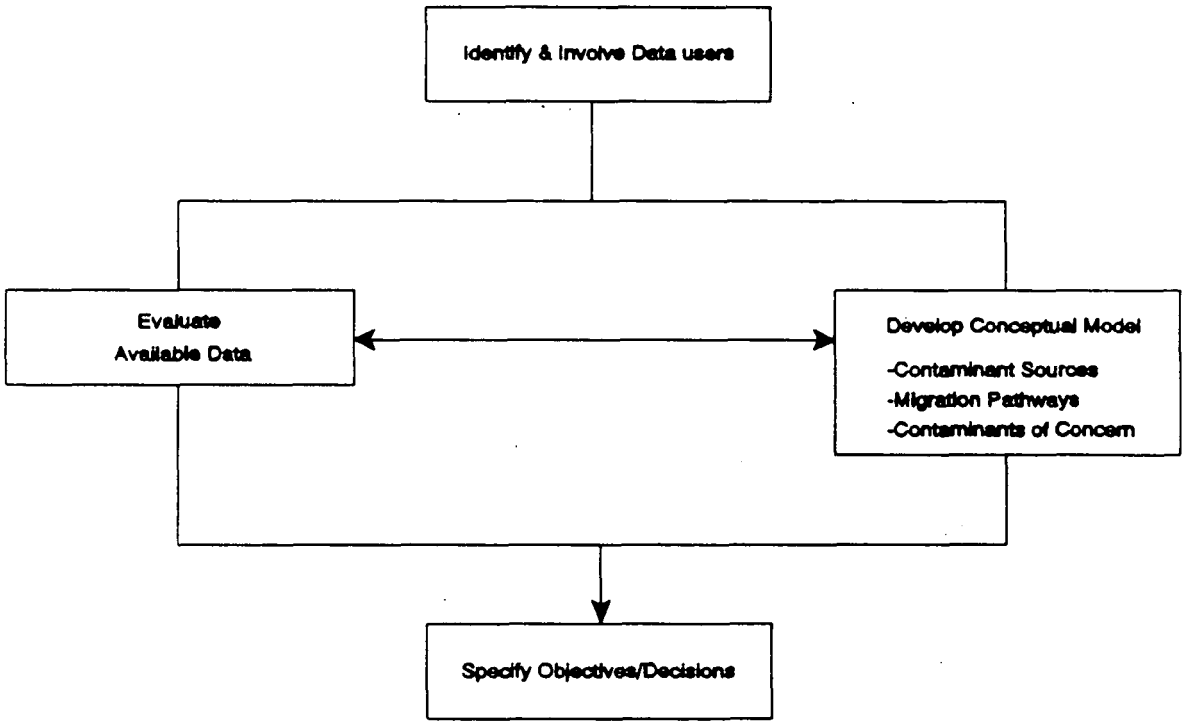


Figure A1.2
DQO PROGRESS WITHIN PHASED WORK
FLOW FOR EXAMPLE RI/FS

Figure A1.3
DQO STAGE I ELEMENTS



Decision Makers

The principal decision-makers are identified as the federal officials responsible for RFP operations and the federal and state regulatory officials responsible for environmental protection.

U.S. Department of Energy - Office of Environmental Restoration and Waste Management

The DOE is identified as the owner of the RFP and the lead federal agency responsible for operation of the facility. The DOE-Office of Environmental Restoration and Waste Management is charged with coordinating ER Programs conducted at DOE facilities under its jurisdictions. The identified decision-makers are the Secretary of Energy and the Acting Assistant Secretary for Environmental Restoration and Waste Management.

U.S. Department of Energy - Rocky Flats Office (RFO)

The DOE/RFO group charged with supervising the ER Program at the RFP is the Environmental Restoration Division. The identified decision-makers are the DOE/RFO Manager, Assistant Manager for Environmental Management and the Acting Environmental Restoration Division Director.

U.S. Environmental Protection Agency (EPA) Region VIII

The EPA-Region VIII group overseeing environmental restoration activities at the RFP is the Waste Management Division. The identified decision-makers are the Waste Management Division Director, Federal Facilities Branch Chief and the Rocky Flats Remedial PM.

State of Colorado Department of Health (CDH)

The CDH group overseeing the ER Program at the RFP is the Hazardous Materials and Waste Management (HMWM) Division. The identified decision-makers are the HMWM Division Director, the Hazardous Waste Section Leader, and the Unit Leaders of the Hazardous Waste Facilities Unit and the Monitoring and Enforcement Unit.

Program Management Staff

The principal program management staff are identified as the prime EG&G contractor personnel responsible for ER Program activities.

EG&G Rocky Flats Plant Environmental Management Department

The EG&G Rocky Flats, Inc. EM Department has primary responsibility for planning and implementation of ER projects at RFP. The identified data users are the Associate General Manager for Environmental Restoration and Waste Management, the EM Department Director, EM Department Division Managers, and matrix project personnel from other RFP or external EG&G organizations.

Technical Personnel

The principal technical personnel are identified as the EG&G RFP Technical Specialists and subcontractors responsible for supervising, coordinating, and performing ER activities.

EVALUATION OF EXISTING DATA

Available information will be reviewed and evaluated as the initial step in the RI/FS and/or RFI/CMS process. A number of factors relate to the quality of data and its adequacy for use, including the following considerations:

- Age of the data.
- Analytical methods used.
- Detection limits of the methods.
- QA/QC procedures and documentation.

The evaluation will be summarized in the specific work plan and should be as thorough and accurate as possible.

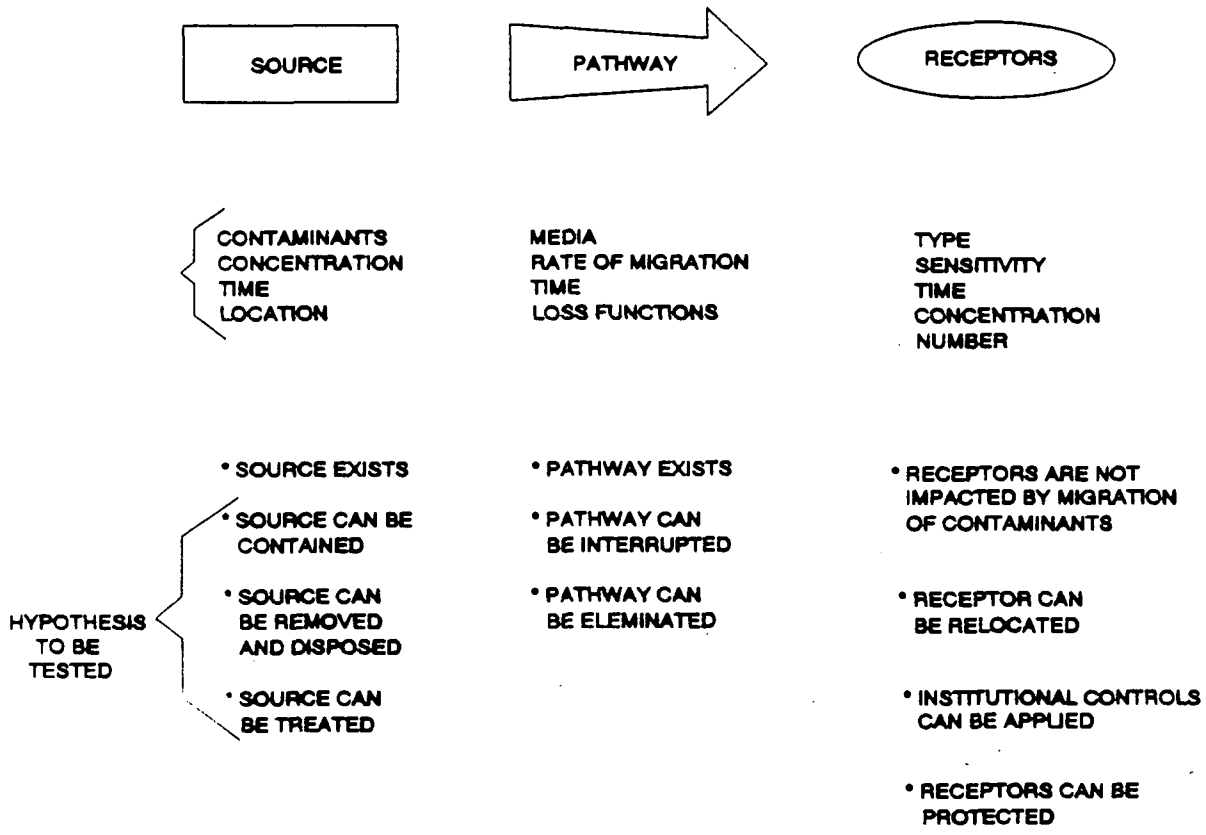
DEVELOPMENT OF CONCEPTUAL MODEL

Conceptual models describe a site and its environs and present hypotheses regarding the contaminants present, their routes of migration, and their potential impact on sensitive receptors. Figure A1.4 shows the basic elements of a conceptual model for an uncontrolled hazardous waste site.

SPECIFY OBJECTIVES/DECISIONS

In a broad sense, the objective of a remedial action program is to determine the nature and extent of the release or threat of release of hazardous substances and to select a cost effective remedial action to minimize or eliminate that threat. The primary purpose for collecting environmental measurement data specified in this QAPjP is to support investigations of the SWMUs contained in each of the OUs on the RFP, as identified in the RFP IAG. The

Figure A1.4
ELEMENTS OF A CONCEPTUAL MODEL



specific objectives of the project and the decisions that must be made must be discussed in the specific WP and summarized in the QAA. Table A1.1 lists general RI/FS objectives.

STAGE 2 - IDENTIFY DATA USES/NEEDS

Stage 2 of the DQO development process identifies data uses and specifies the types of data needed to meet the project objectives. Although data needs are identified generally during Stage 1, Stage 2 specifically defines data uses.

The major elements of Stage 2, as shown in Figure A1.5, are:

- Identify data uses.
- Identify data types.
- Identify data quality needs.
- Identify data quantity needs.
- Evaluate sampling/analysis options.
- Review PARCC parameters.

Stage 2 begins after the conceptual model is developed and overall project objectives are established.

IDENTIFY DATA USES

Data uses must be stated very specifically to serve their purpose in development of DQOs. The most common data use categories are:

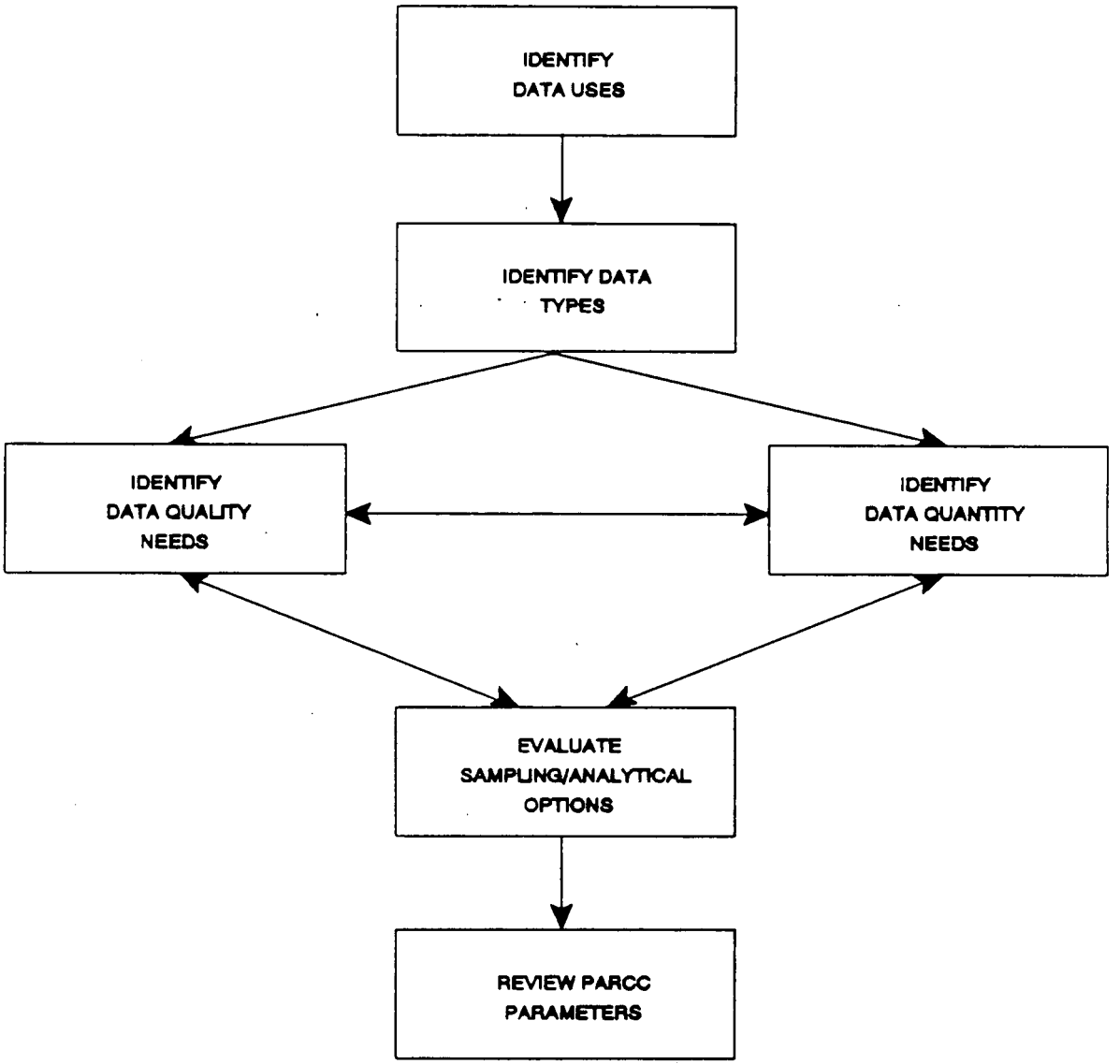
- Site Characterization (geologic, air, surface water, groundwater, etc.).
- Health and Safety.

Table A1.1
GENERAL RI/FS OBJECTIVES

Objectives	RI Activity	FS Activity
- Determine presence or absence of contaminants	- Establish presence/absence of contaminants at source and in all pathways	- Evaluate applicability of no action alternative for source areas/pathways
- Determine types of contaminants	- Establish "nature" of contaminants at source and in pathways; relate contaminants to PRP-cost recovery	- Evaluate environmental/ public health threat; identify applicable remedial technologies
- Determine quantities (concentrations) of contaminants	- Establish concentration gradients	- Evaluate costs to achieve applicable or relevant and appropriate standards
- Determine mechanism of contaminant release to pathways	- Establish mechanics of source/pathway(s) interface	- Evaluate effectiveness of containment technologies
- Determine direction of pathway(s) transport	- Establish pathway(s)/transport route(s); identify potential receptor(s)	- Identify most effective points in pathway to control transport of contaminants
- Determine boundaries of source(s) transport	- Establish horizontal/vertical boundaries of source(s) and pathway(s) of contamination	- Evaluate costs to achieve relevant/applicable standards; identify applicable remedial technologies
- Determine environmental/public health factors	- Establish routes of exposure, and environmental and public health threat	- Evaluate applicable standards or risk; identify applicable remedial technologies
- Determine source/pathway contaminant characteristics with respect to mitigation (bench studies)	- Establish range of contaminants/ concentrations	- Evaluate treatment schemes

Figure A1.5

DQO STAGE 2 ELEMENTS



- Risk Assessment.
- Environmental Evaluation.
- Evaluation of Alternatives.

Table A1.2 is a form that may be used to document the thought processes involved in determining what the data will be used for. The form may be included in the specific work plan.

IDENTIFY DATA TYPES

Data use categories define the general purposes for which data will be collected. Based on the intended uses, a concise statement regarding the data types needed can be developed.

The data collected from RFP field activities will be used in conjunction with existing data to determine availability and toxicity of the contaminants of concern to the environment on the RFP. Data types will consist of field survey data and laboratory analytical results of samples.

Typical media that will be sampled and/or surveyed during ER activities are:

- Terrestrial Media
  - Vegetation
  - Invertebrates
  - Vertebrates

- Aquatic Media
  - Vegetation
  - Invertebrates
  - Vertebrates

Table A1.2
DATA USES

SITE
NAME _____
LOCATION _____
NUMBER _____
PHASE _____
RI1 RI2 RI3 ERA FS RD RA

EPA REGION
_____

DATE _____
CONTRACTOR _____
SITE MANAGER _____

DATA USE / MEDIA	SITE CHARACTERIZATION (INCLUDING HEALTH & SAFETY)	HUMAN HEALTH	EVALUATION OF ALTERNATIVES	ENVIRONMENTAL EVALUATION	OTHER _____
SOURCE SAMPLING TYPE _____					
SOIL SAMPLING					
GROUND WATER SAMPLING					
SURFACE WATER SEDIMENT SAMPLING					
AIR SAMPLING					
BIOLOGICAL SAMPLING					
OTHER _____					

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- Physical Media
  - Surface water
  - Groundwater and vadose zone moisture
  - Sediments/sludges
  - Surface soils and subsurface materials
  - Air

The sampling and survey data will be used to determine the extent of potential contamination, the nature of the contamination, and the potential exposure pathways.

Specific field survey and laboratory analysis data needs for each of the media types are described below:

FIELD DATA

Terrestrial Media

Sampling and survey methods for terrestrial media are currently under development and will be described in the WP/QAA for Environmental Evaluation (EE) activities. The EE WP/QAA will contain the specific field survey and laboratory analysis data requirements for each media type.

Aquatic Media

Sampling and survey methods for aquatic media are also required for the EE and are currently under development. The WP/QAA for EE will describe in detail the sampling and survey data requirements for the aquatic media types.

Physical Media

- Hydrogeologic Data. Hydrogeologic data, including groundwater, vadose zone moisture and subsurface materials information, are needed primarily for determining geologic and hydrologic characteristics of the RFP site and specific site areas under investigation. This information will also be used in contaminant pathway analysis.

  Geologic data are obtained from geologic mapping, drilling, and geophysical logging activities. Hydrologic data are obtained from hydrologic mapping, well installation, well completion, and surface water measurement activities. Data collected during these activities are recorded in logging formats prescribed in subcontractor technical specification documents and according to project WP/QAA.

  Air, surface soils, and sediments sampling and survey methods are required for site characterization and pathway analysis. Details are specified in the WP/QAAs.

Laboratory Analysis Data

- Organic Chemistry. Organic chemistry data includes the compounds on EPA's CLP Target Compounds List (TCL) and as specified in the EG&G GRRASP as well as other compounds identified in the DQO process. Analyses for organics are essential because some of these compounds have been identified in groundwater, surface water, and soil samples collected during Phase I Remedial Investigation studies. These analyses are needed for comparison of CERCLA sites and RCRA closure units data with Applicable or Relevant and Appropriate Requirements (ARARs).

- Inorganic (Metals) Chemistry. Soil, sediments, groundwater, surface water and tap water include analytes listed in the CLP Inorganic Target Analyte List (TAL) and for any additional parameters specified in the GRRASP or in the DQO process.

- Other Water Quality Parameters. Analyses needed for other water quality parameters include, but are not limited to, the following:

  - Bicarbonate
  - Carbonate/Bicarbonate
  - Chloride
  - Nitrate
  - Nitrite as N
  - Sulfate
  - Sulfide
  - Total Dissolved Solids
  - Total Suspended Solids
  - Dissolved Oxygen
  - Oil and Grease
  - Phosphate
  - Percent Solids
  - Percent Moisture
  - pH
  - Specific Conductance
  - Temperature
  - Alkalinity

- Radiochemistry. Radiochemistry analyses are needed for soil, sediments, groundwater, and surface and tap water samples. The following radionuclide analyses will be performed:

  - Plutonium^{239,240}
  - Americium^{241}
  - Uranium^{233,234}

- Uranium^{238}
- Uranium^{235}
- Tritium
- Strontium^{89,90}
- Cesium^{137}
- Gross Alpha
- Gross Beta
- Radium^{226}
- Radium^{228}
- Curium^{244}
- Neptunium^{237}
- Thorium^{230,232}

These analyses are needed for comparison with EPA and CDH ARARs and RFP background data. Methods available for conducting most of these analyses are included in the GRRASP.

- Air Quality. Radioactive ambient air data are required for air monitoring samples. Radiochemistry analyses are needed for radioactive ambient air samples.

These analyses provide data for compliance under the Clean Air Act (CAA) and address the ARARs. Methods employed for analysis are not available under CLP, and have been developed in SOPs for the ambient air analyses. A radioactive ambient air monitoring program procedure is utilized to provide control of this activity.

IDENTIFY DATA QUALITY NEEDS

Consideration of data quality needs should begin with the identification of data uses and data types. Important factors in defining data quality include:

- Prioritized data uses.
- Appropriate analytical levels.
- Contaminants of concern.
- Levels of concern.
- Required detection limit.
- Critical samples.

Analytical Levels

Table A1.3 summarizes analytical levels appropriate to data uses. Table A1.4 is a form that should be used to document the analytical levels chosen for each type of data use. The form should be included in the WP.

IDENTIFYING DATA QUANTITY NEEDS

The number of samples which should be collected can be determined using a variety of approaches. The validity of the approach is dependent on the characteristics of the media under investigation and the assumptions used to select sample locations. A statistician may be utilized in determining the necessary quantity of data.

EVALUATE SAMPLING/ANALYSIS OPTIONS

Following the identification of data uses, data types, and data quality and quantity needs, an evaluation of sampling and analysis options can be undertaken. Numerous sampling and analysis options could be developed for any data collection activity. The possible options are based on the data types needed.

Table A1.3
SUMMARY OF ANALYTICAL LEVELS APPROPRIATE TO DATA USES

DATA USES	ANALYTICAL LEVEL	TYPE OF ANALYSIS	LIMITATIONS	DATA QUALITY
Site Characterization Monitoring During Implementation	LEVEL I	• Total Organic/Inorganic Vapor Detection Using Portable Instruments • Field Test Kits	• Instruments Respond to Naturally-Occurring Compounds	• If Instruments Calibrated and Data Interpretated Correctly, can Provide Indication of Contamination
Site Characterization Evaluation of Alternatives Engineering Design Monitoring During Implementation	LEVEL II	• Variety of Organics by GC; Inorganics by AA; XRF • Tentative ID; Analyte-Specific • Detection Limits Vary from Low ppm to Low ppb	• Tentative ID • Techniques/Instruments Limited Mostly to Volatiles, Metals	• Dependent on QA/QC Steps Employed • Data Typically Reported in Concentration Ranges
Risk Assessment PRP Determination Site Characterization Evaluation of Alternatives Engineering Design Monitoring During Implementation	LEVEL III	• Organics/Inorganics Using EPA Procedures Other than CLP can be Analyte-Specific • RCRA Characteristic Tests	• Tentative ID in Some Cases • Can Provide Data of Same Quality as Levels IV, MS	• Similar Detection Limits to CLP • Less Rigorous QA/QC
Risk Assessment PRP Determination Evaluation of Alternatives Engineering Design	LEVEL IV	• HSL Organics/Inorganics by GC/MS; AA; ICP • Low ppb Detection Limit	• Tentative Identification of Non-HSL Parameters • Some Time May be Required for Validation of Packages	• Goal is Data of Known Quality • Rigorous QA/QC
Risk Assessment PRP Determination	LEVEL V	• Non-Conventional Parameters • Method-Specific Detection Limits • Modification of Existing Methods • Appendix Parameters	• May Require Method Development/Modification • Mechanism to Obtain Services Requires Special Lead Time	• Method-Specific

- LEVEL V - Non-standard methods. Analyses which may require method modification and/or development. CLP Special Analytical Services (SAS) are considered Level V.
- LEVEL IV - CLP Routine Analytical Services (RAS). This level is characterized by rigorous QA/QC protocols and documentation and provides qualitative and quantitative analytical data. Some regions have obtained similar support via their own regional laboratories, university laboratories, or other commertial laboratories.
- LEVEL III - Laboratory analysis using methods other than the CLP RAS. This level is used primarily in support of engineering studies using standard EPA approved procedures. Some procedures may be equivalent to CLP RAS, without the CLP requirements for documentation.
- LEVEL II - Field analysis. This level is characterized by the use of portable analytical instruments which can be used on-site, or in mobile laboratories stationed near a site (close-support labs). Depending upon the types of contaminants, sample matrix, and personal skills, qualitative and quantitative data can be obtained.
- LEVEL I - Field screening. This level is characterized by the use of portable instruments which can provide real-time data to assist in the optimization of sampling point locations and for health and safety support. Data can be generated regarding the presence or absence of certain contaminants (especially volatiles) at sampling locations.

Table A1.4
APPROPRIATE ANALYTICAL LEVELS - BY DATA USE

DATA USE / ANALYTICAL LEVEL	SITE CHARACTERIZATION (INCLUDING HEALTH & SAFETY)	RISK ASSESSMENT	EVALUATION OF ALTERNATIVES	ENGINEERING DESIGN OF REMEDIAL ACTION	OTHER _____
LEVEL I	✓				
LEVEL II	✓		✓		
LEVEL III	✓	✓	✓	✓	
LEVEL IV		✓	✓	✓	
LEVEL V		✓		✓	
OTHER				✓	

NOTE: CHECK APPROPRIATE BOX(ES)

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The options chosen for sampling and analysis must be specifically described in the WP and summarized in the QAA.

Figure A1.6 is a form for summarizing the DQO information and decisions made up to this point. It should be completed and included in the specific WP and the information summarized in the QAA.

REVIEW PARCC PARAMETER INFORMATION

The PARCC parameters consist of precision, accuracy, representativeness, comparability, and completeness. The parameters are indicators of data quality. Ideally, the end use of the measurement data should define the necessary PARCC parameters. In the ideal situation, numerical precision, accuracy, and completeness goals would be established and these goals used in selecting the measurement methods. However, RI/FS work does not typically fit this ideal scenario. RI/FS sites are so different that it is impractical to set universal PARCC goals at the outset. Instead, historical precision and accuracy achieved by different standard analytical methods should be reviewed as an aid in selecting the most appropriate technique.

The specific objectives associated with each of these parameters are dependent on the intended use(s) of the data. Specific objectives are described in WP/QAA prior to initiating any sampling or analysis activities.

Figure A 1.6
DQO SUMMARY FORM

1. SITE

NAME _____
LOCATION _____
NUMBER _____

EPA REGION _____

PHASE _____
RI 1 RI 2 RI 3 ERA FS RO RA
(CIRCLE ONE)

2. Media *(CIRCLE ONE)*	SOIL	GW	SW/SED	AIR	BIO	OTHER _____

3. USE *(CIRCLE ALL THAT APPLY)*	SITE CHARAC. (H&S)	RISK ASSESS.	EVAL. ALTS.	ENGG DESIGN	PRP DETER.	MONTORING REMEDIAL ACTION	OTHER _____

4. OBJECTIVE _____

5. SITE INFORMATION

AREA _____ DEPTH TO GROUND WATER _____
GROUND WATER LINE _____
SOIL TYPES _____
SENSITIVE RECEPTORS _____

6. DATA TYPES *(CIRCLE APPROPRIATE DATA TYPES)*

A. ANALYTICAL DATA

pH	PESTICIDES	TOX
CONDUCTIVITY	PCB	TOC
VOA	METALS	STX
ASN	CYANIDE	COD
TCLP	_____	_____

B. PHYSICAL DATA

PERMEABILITY	HYDRAULIC HEAD
POROSITY	PENETRATION TEST
GRAIN SIZE	HARDNESS
BULK DENSITY	_____
_____	_____

7. SAMPLING METHOD *(CIRCLE METHODS TO BE USED)*

ENVIRONMENTAL	BIASED	GRAB	NON-INTRUSIVE	PHASED
SOURCE	GRID	COMPOSITE	INTRUSIVE	_____

8. ANALYTICAL LEVELS *(INDICATE LEVEL(S) AND EQUIPMENT & METHODS)*

LEVEL 1 FIELD SCREENING-EQUIPMENT _____
LEVEL 2 FIELD ANALYSIS-EQUIPMENT _____
LEVEL 3 NON-CLP LABORATORY-METHODS _____
LEVEL 4 CLP/RAS-METHODS _____
LEVEL 5 NON STANDARD _____

9. SAMPLING PROCEDURES

BACKGROUND-# PER EVENT OR _____
CRITICAL (LIST) _____
PROCEDURES _____

10. QUALITY CONTROL SAMPLES *(CONFIRM OR SET STANDARD)*

A. FIELD
COLLOCATED-5% OR _____
REPLICATE-5% OR _____
FIELD BLANK-5% OR _____
TRIP BLANK-1 PER DAY OR _____

B. LABORATORY
REAGENT BLANK-1 PER ANALYSIS BATCH OR _____
REPLICATE-1 PER ANALYSIS BATCH OR _____
MATRIX SPACE-1 PER ANALYSIS BATCH OR _____
OTHER _____

11. BUDGET REQUIRMENTS

BUDGET _____ SCHEDULE _____
STAFF _____

CONTRACTOR _____ PRIME CONTRACTOR _____
SITE MANGER _____ DATE _____

FOR DETAILS SEE SAMPLING & ANALYSES PLAN

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DQO SUMMARY FORM INSTRUCTIONS

1. SITE - identify the site and phase of the work to be conducted
   - NAME - Site name or assignment as stated in the WA
   - LOCATION - City or Town, Country and State where site is located
   - NUMBER - Site number as stated in the WA
   - EPA REGION - EPA Region where the site is located
   - PHASE - Circle work phase for which DQOs are being developed: (number sequentially for each phase as appropriate):
     RI - Remedial
     ERA - Expedited Response Action
     FS - Feasibility Study
     RD - Remedial Design
     RA - Remedial Action

2. MEDIA - Circle the media being investigated: only one form will be completed for each media
   - SOIL - Surface and subsurface soils
   - GW - Ground water
   - SW/SED - Surface water and sediment (a sediment sample will be taken if possible at each surface water sampling location)
   - AIR - Air quality and respirable dust monitoring
   - BIO - Biological monitoring, flora and fauna
   - OTHER - indicate other "media" being investigated i.e. buildings, underground conduits, etc.

3. USE - Circle the intended use(s) of the data to be developed.
   - SITE CHARAC. (H&S) - Site characterization which includes a determination of the level(s) of health and safety protection required at the site
   - RISK ASSESS - Risk assessment, data to be used to perform the endangerment assessment or public health evaluation
   - EVAL ALTS - Evaluate alternatives, data will be used to evaluate or screen remedial/technological alternatives
   - ENG'G DESIGN - Data will be used to perform detailed engineering design of remedy
   - MONITORING - Data will be used to monitor during remedy implementation or establish baseline conditions for long term monitoring after site remediation
   - PRP DETERMINATION - Data will be used to confirm/fingerprint contaminants to specific potentially responsible parties for possible future or pending enforcement actions
   - OTHER - indicate other specific data uses

4. OBJECTIVE - Provide a concise, specific statement that answers the question "Why am I taking these samples?"

5. SITE INFORMATION - Provide the site information necessary to gain an overview of the site and the relative complexity and extent of data requirements
   - AREA - indicate the area of the site in acres and an indication of the configuration (length and width)
   - DEPTH TO GROUND WATER - indicate the depth to ground water from the ground surface, to the extent known identify seasonal fluctuation and the depth and thickness of multiple aquifers
   - GROUND WATER USE - identify both potable and non-potable ground water use(s) by aquifer, if appropriate, and the point(s) of extraction relative to the site
   - SOIL TYPES - Identify, to the extent known, the site and strata and relative depths below ground surface
   - SENSITIVE RECEPTORS - identify population and environmental concerns, relative to the site, which could be impacted by contaminant migration

6. DATA TYPES - Circle the appropriate analytical and physical strata required to determine the type, degree, extent and migration characteristics of the contaminants and the required site characteristics. The selection of data types required must be developed by the site manager with the data users as described in Section 1.9

7. SAMPLING METHODS - Circle the appropriate sampling method(s) to be used in obtaining the required data in accordance with the objectives above
   - ENVIRONMENTAL - Refers to media sampling of air, water, soils and the biological environment to determine the extent of contamination
   - SOURCE - Refers to the sampling of the actual contamination source(s)
   - BIASED - Refers to sampling which focuses on a specific site area, characteristic or problem factor based upon site knowledge and/or modeling
   - GRID - Refers to unbiased sampling which provides a representative estimate of contamination problem over the entire site
   - GRAB - Refers to discrete samples which are representative of a specific location at a specific point in time
   - COMPOSITE - The mixture of a number of grab samples to represent the average properties of the

parameters of concern over the extent of the area sampled
- NON-INTRUSIVE - Refers to obtaining data using methods and equipment that do not require the physical extraction of sample from the media being sampled
- INTRUSIVE - Refers to physically extracting samples from the media being sampled
- PHASED - Refers to performing discrete three-phased sampling events and using the information obtained in the previous event to refine the subsequent sampling event

8. ANALYTICAL LEVELS - The analytical levels are described in Section 9 of the Guidance
- LEVEL 1 FIELD SCREENING - EQUIPMENT - identify the field monitoring equipment to be used and the manufacturer's specified detection levels when known
- LEVEL 2 FIELD ANALYSIS - EQUIPMENT - identify the field analysis to be used and the historically achievable instrument detection levels
- LEVEL 3 NON-CLP LABORATORY - METHODS - identify the laboratory method(s) to be used and the historically achievable precision and accuracy when available
- LEVEL 4 CLP/RAS - METHODS - identify the CLP laboratory method(s) to be used and the historically achievable precision and accuracy
- LEVEL 5 NON-STANDARD - specify requirement for non-standard analysis, analytical procedures to be used and required precision and accuracy

9. SAMPLING PROCEDURES - The procedures to be used in obtaining the required samples are to be defined, a description of the critical samples is to be provided and the requirement of obtaining a minimum of two background samples per sampling event is to be confirmed or the deviation from this minimum standard defined

10. QUALITY CONTROL SAMPLES - The identified minimum standards for the field and laboratory quality control samples must be confirmed or reduced on a site specific basis

11. BUDGET REQUIREMENTS - Based upon the analysis summarized above the critical resource requirements shall be defined
- BUDGET - the estimated cost of the sampling and analysis shall be presented in dollars
- SCHEDULE - the total time required to perform the sampling and the estimated time, as appropriate to perform the analysis shall be presented by calendar days, by phase
- STAFF - the key staff disciplines required to perform the sampling shall be identified

The form shall identify the contractor directly responsible for the work the prime contractor and must be signed and dated by the site manager.

Precision

Precision is a quantitative measure of data quality which refers to the reproducibility or degree of agreement among replicate measurements of a single analyte. The closer the numerical values of the measurements are to each other, the more precise the measurements. One of the methods used to estimate the precision of a method is the standard error of the estimates for the least square regression line of "measured" versus "target" concentrations. The primary role of this application is to characterize the precision of any analysis method under specified conditions. This allows comparison of precision of different results produced by the same method. Analytical precision for a single analyte may be expressed as a percentage of the difference between results of duplicate samples and matrix spike duplicates for a given analyte. Precision may be determined from the results of duplicate and matrix spike duplicate analyses. For example, relative percent difference may be calculated as:

$$\text{Precision} = \text{Relative Percent Difference} = \frac{C_1 - C_2}{\frac{C_1 + C_2}{2}} \times 100\%$$

where:

C_1 = Concentration of the analyte in the sample or matrix spike duplicate
C_2 = Concentration of the analyte in the duplicate/replicate or matrix spike duplicate

During the collection of data using field methods or instrumentation, precision is checked by reporting several measurements taken at one location and comparing the results. Precision shall be reported as the relative percent difference for two results and as the standard deviation for three or more results. Sample collection precision shall be measured in the laboratory with the analysis of field replicates and laboratory duplicates.

Accuracy

Accuracy is a quantitative measure of data quality which refers to the degree of difference between measured or calculated values and the true value. The closer to the true value (concentration), the more accurate the measurement. One of the measures of analytical accuracy is expressed as the percent recovery of a spike or tracer which has been added to the environmental sample at a known concentration before analysis. For example, accuracy may be determined from the results of matrix spike and other appropriate analyses as:

$$\text{Accuracy} = \text{Percent Recovery} = \frac{A_r - A_o}{A_F} \times 100\%$$

where:

A_r = Total amount found in spiked sample
A_o = Amount found in unspiked sample
A_F = Amount added to sample

Representativeness

Representativeness is a qualitative measure of data quality defined by the degree to which the data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition. If the same results are reproducible, the data obtained can be said to represent the environmental condition. Representativeness is ensured by collecting sufficient samples of an environmental medium, properly chosen with respect to place and time. The methods and protocols used to select samples that are representative of a particular sampling site will be described in the specific WP/QAA.

Completeness

Completeness is a quantitative measure of data quality expressed as the percentage of valid or acceptable data obtained from a measurement system. The objectives of the field sampling program are to obtain samples for all analyses required at each individual site, to provide sufficient sample material to complete those analyses, and to produce QC samples that represent all possible contamination situations; i.e., potential contamination during sample collection, transportation, or storage. The goal of completeness for data packages is 100 percent; however, this is not a requirement.

For example, one equation used to calculate percent completeness is:

$$\text{Completeness} = DP_v = \frac{DP_t - DP_i}{DP_t} \times 100\%$$

where:

DP_v = Valid or acceptable data points
DP_i = Invalid data point (sum of the percent recovery values outside project or laboratory control limits and number of contaminants in blank samples)
DP_t = Total number of QC data points (e.g., each volatile organic compounds [VOC] analysis is equal to 34 data points, each semivolatile analysis is equal to 65 data points, each pesticide/PCB analysis is equal to 27 data points, each metals/cyanide analysis is equal to 29 data points, each field and inorganic analysis is equal to 1 data point, and each radiochemistry analysis is equal to 1 data point per analysis).

Comparability

Comparability is a qualitative measure defined by the confidence with which one data set can be compared to another. Differences in field and laboratory procedures greatly affect comparability. To optimize comparability, only the specific methods and protocols that have been selected or specified as appropriate for ER activities will be used to collect and analyze

samples. By using carefully selected sampling and analysis procedures, data sets can be comparable at each specific site at the RFP and between sites.

STAGE 3 - DESIGN DATA COLLECTION PROGRAM

The major elements of Stage 3 are:

- Assembly of data collection components.
- Development of data collection documentation.

These stages are shown in Figure A1.7.

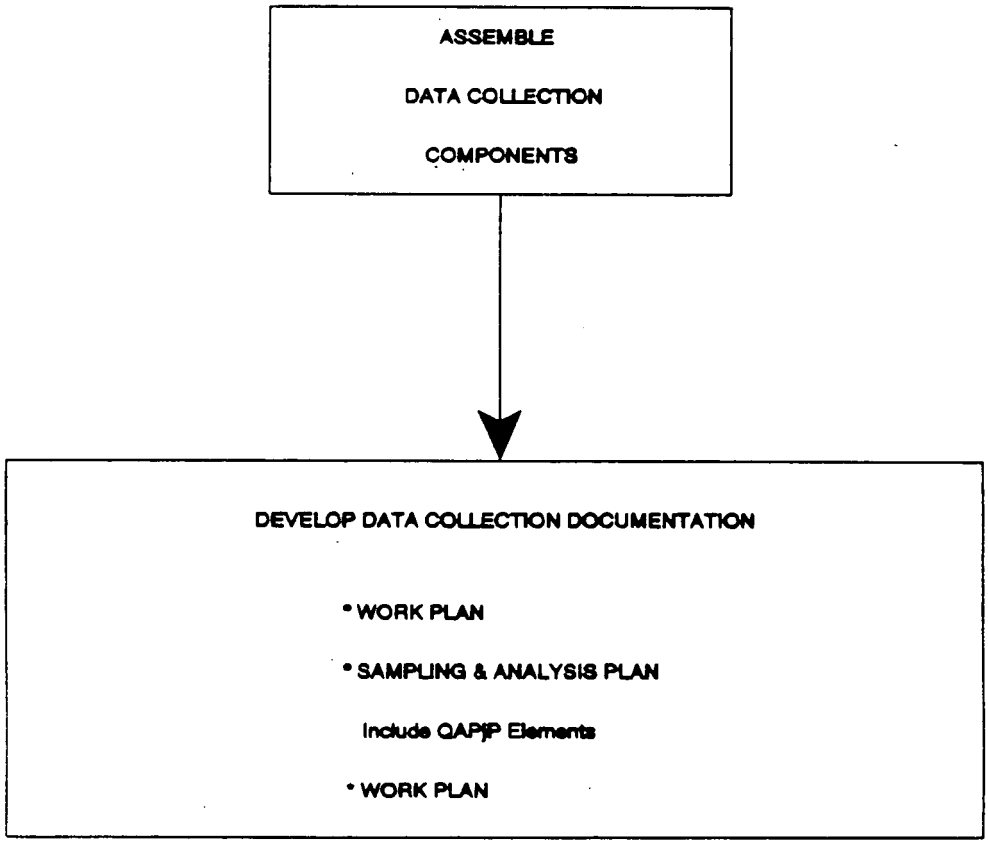
ASSEMBLE DATA COLLECTION COMPONENTS

The intent of Stage 3 is to compile the information and DQOs developed for specific tasks in Stage 2 into a comprehensive data collection program. A detailed list of all samples to be collected should be assembled in a format that includes:

- Phase,
- Media,
- Sample type,
- Number of samples,
- Sample location,
- Analytical methods, and
- QC samples (type and number).

Figure A1-7

DQO STAGE 3 ELEMENTS



DEVELOP DATA COLLECTION DOCUMENTATION

The output of the DQO development process is a well-defined WP with summary information provided in the QAA.

The DQO process provided here does not require the submittal of deliverables in addition to those already established in the regions. Rather, the DQO process provides a framework to ensure that all the pertinent issues related to the collection of data with known quality are addressed.

DQOs will be developed in the WPs and will be summarized in the QAAs. Once the DQOs have been established, they are reviewed by EMAD to determine analytical needs and laboratory availability. EMAD will also determine if the existing validation guidelines are appropriate and whether or not they will need to be expanded.

TITLE: APPENDIX B

Approved By:

Director, Environmental Management 6/7/91

APPENDIX B

Table B1: Analytical Methods, Detection Limits, and Data Quality Objectives

ANALYTICAL METHODS, DETECTION LIMITS, AND DATA QUALITY OBJECTIVES

Analyte	Method	SW	GW	BOREHOLE	SED	Required Detection Limits Water	Required Detection Limits Soil/Sed.	Precision Objective	Accuracy Objective
INDICATORS									
Total Suspended Solids	EPA 160.2[d]	X[u]				10 mg/L	NA	20%RPD[r]	80-120% LCS Recovery
Total Dissolved Solids	EPA 160.1[d]	X[f]	X[f]			5 mg/L	NA	20%RPD[r]	80-120% LCS Recovery
pH	EPA 150.1[d]	X[u]	X[f]			0.1 pH units	0.1 pH units	NA	±0.05 pH units
INORGANICS									
Target Analyte List - Metals		X[f]	X[f]	X	X			WATER/SOIL	WATER/SOIL
Aluminum	EPA CLP SOW[e]					200 ug/L[s]	40 mg/Kg[s]	**	***
Antimony	EPA CLP SOW[e]					60	12		
Arsenic (GFAA)	EPA CLP SOW[e]					10	2		
Barium	EPA CLP SOW[e]					200	40		
Beryllium	EPA CLP SOW[e]					5	1.0		
Cadmium	EPA CLP SOW[e]					5	1.0		
Calcium	EPA CLP SOW[e]					5000	2000		
Chromium	EPA CLP SOW[e]					10	2.0		
Cobalt	EPA CLP SOW[e]					50	10		
Copper	EPA CLP SOW[e]					25	5.0		
Cyanide	EPA 335.3 (modified for CLP)[e,o]					5	10		
Iron	EPA CLP SOW[e]					100 ug/L[s]	20 mg/Kg[s]		
Lead (GFAA)	EPA CLP SOW[e]					3	1.0		
Magnesium	EPA CLP SOW[e]					5000	2000		
Manganese	EPA CLP SOW[e]					15	3.0		
Mercury (CVAA)	EPA CLP SOW[e]					0.2	0.2		
Nickel	EPA CLP SOW[e]					40	8.0		
Potassium	EPA CLP SOW[e]					5000	2000		
Selenium (GFAA)	EPA CLP SOW[e]					5	1.0		
Silver	EPA CLP SOW[e]					10	2.0		
Sodium	EPA CLP SOW[e]					5000	2000		
Thallium (GFAA)	EPA CLP SOW[e]					10	2.0		
Vanadium	EPA CLP SOW[e]					50	10		
Zinc	EPA CLP SOW[e]					20	4.0		

ANALYTICAL METHODS, DETECTION LIMITS, AND DATA QUALITY OBJECTIVES

Analyte	Method	SW	GW	BOREHOLE	SED	Required Detection Limits Water	Required Detection Limits Soil/Sed.	Precision Objective	Accuracy Objective
Other Metals		X[u]	X[f]	X	X			WATER/SOIL	WATER/SOIL
Molybdenum	EPA CLP SOW[b] (ICAP)					8 ug/L[a]	40 mg/Kg[a]	**	***
Cesium	EPA CLP SOW[b]					1000	200		
Strontium	EPA CLP SOW[b]					200	40		
Lithium	EPA CLP SOW[b]					100	20		
Tin	EPA CLP SOW[b]					200	40		
Other Inorganics									
Percent Solids	EPA 160.3[a]			X	X	NA	10 mg	NA	NA
Sulfide	EPA 376.1[a]			X	X	NA	4 ug/g	Same as metals	Same as metals
ANIONS								Water/Soil	Water/Soil
Carbonate	EPA 310.1[a]	X[u]	X[u]			10 mg/L	NA	Same as metals	Same as metals
Bicarbonate	EPA 310.1[a]	X[u]	X[u]			10 mg/L	NA		
Chloride	EPA 325.2[a]	X[u]	X[u]			5 mg/L	NA		
Sulfate	EPA 375.4[a]	X[u]	X[u]			5 mg/L	NA		
Nitrate as N	EPA 353.2[a] or 353.3[a]	X[u]	X[u]			1 mg/L	NA		
Fluoride	EPA 340.2[a]	X[u]	X[u]			5 mg/L	NA		
Oil and Grease	EPA 413.2[a]	X[u]				5 mg/L	NA	**	***
*Total Petroleum Hydrocarbons	EPA 418.1[a]			X	X	NA	10 mg/Kg	NA/40	NA/80-120
Target Compound List - Volatiles	EPA CLP SOW[c]	X[u]	X[u]	X	X			WATER/SOIL	WATER/SOIL
Chloromethane	EPA CLP SOW[c]					10 ug/L	10 ug/Kg (low)[j]	**	***
Bromomethane	EPA CLP SOW[c]					10	10		
Vinyl Chloride	EPA CLP SOW[c]					10	10		
Chloroethane	EPA CLP SOW[c]					10	10		
Methylene Chloride	EPA CLP SOW[c]					5	5		
Acetone	EPA CLP SOW[c]					10	10		
Carbon Disulfide	EPA CLP SOW[c]					5	5		
1,1-Dichloroethene	EPA CLP SOW[c]					5	5		
1,1-Dichororethane	EPA CLP SOW[c]					5 ug/L	5 ug/Kg(low)[j]		
total 1,2-Dichloroethene	EPA CLP SOW[c]					5	5		

ANALYTICAL METHODS, DETECTION LIMITS, AND DATA QUALITY OBJECTIVES

Analyte	Method	SW	GW	BOREHOLE	SED	Required Detection Limits Water	Required Detection Limits Soil/Sed.	Precision Objective	Accuracy Objective
Target Compound List - Volatiles (continued)		X[a]	X[a]	X	X			WATER/SOIL	WATER/SOIL
Chloroform	EPA CLP SOW[c]					5	5	**	***
1,2-Dichloroethane	EPA CLP SOW[c]					1	5		
2-Butanone	EPA CLP SOW[c]					10	10		
1,1,1-Trichoroethane	EPA CLP SOW[c]					5	5		
Carbon Tetrachloride	EPA CLP SOW[c]					5	5		
Vinyl Acetate	EPA CLP SOW[c]					10	10		
Bromodichloromethane	EPA CLP SOW[c]					5	5		
1,2-Dichloropropane	EPA CLP SOW[c]					5	5		
cis-1,3-Dichloropropene	EPA CLP SOW[c]					5	5		
Trichloroethene	EPA CLP SOW[c]					5	5		
Dibromochloromethane	EPA CLP SOW[c]					5	5		
1,1,2-Trichloroethane	EPA CLP SOW[c]					5	5		
Benzene	EPA CLP SOW[c]					5	5		
trans-1,2-Dichloropropene	EPA CLP SOW[c]					5	5		
Bromoform	EPA CLP SOW[c]					5	5		
4-Methyl-2-pentanone	EPA CLP SOW[c]					10	10		
2-Hexanone	EPA CLP SOW[c]					10	10		
Tetrachloroethene	EPA CLP SOW[c]					5	5		
Toluene	EPA CLP SOW[c]					5	5		
1,1,2,2-Tetrachoroethane	EPA CLP SOW[c]					5	5		
Chlorobenzene	EPA CLP SOW[c]					5	5		
Ethyl Benzene	EPA CLP SOW[c]					5	5		
Styrene	EPA CLP SOW[c]					5	5		
Total Xylenes	EPA CLP SOW[c]					5	5		
Target Compound List - Semi-Volatiles			X[a]	X	X			WATER/SOIL	WATER/SOIL
Phenol	EPA CLP SOW[c]					10 ug/L	330 ug/Kg[b]	**	***
bis(2-Chloroethyl)ether	EPA CLP SOW[c]					10	330		
2-Chlorophenol	EPA CLP SOW[c]					10	330		
1,3-Dichlorobenzene	EPA CLP SOW[c]					10	330		
1,4-Dichlorobenzene	EPA CLP SOW[c]					10	330		
Benzyl Alcohol	EPA CLP SOW[c]					10	330		
1,2-Dichlorobenzene	EPA CLP SOW[c]					10	330		
2-Methylphenol	EPA CLP SOW[c]					10	330		
bis(2-Chloroisopropyl)ether	EPA CLP SOW[c]					10	330		
4-Methylphenol	EPA CLP SOW[c]					10	330		
N-Nitroso-Dipropylamine	EPA CLP SOW[c]					10	330		

ANALYTICAL METHODS, DETECTION LIMITS, AND DATA QUALITY OBJECTIVES

Analyte	Method	SW	GW	BOREHOLE	SED	Required Detection Limits Water	Required Detection Limits Soil/Sed.	Precision Objective	Accuracy Objective
Target Compound List - Semi-Volatiles (continued)			X[a]	X	X			WATER/SOIL	WATER/SOIL
Hexachloroethane	EPA CLP SOW[c]					10	330	**	***
Nitrobenzene	EPA CLP SOW[c]					10	330		
Isophorone	EPA CLP SOW[c]					10	330		
2-Nitrophenol	EPA CLP SOW[c]					10	330		
2,4-Dimethylphenol	EPA CLP SOW[c]					10	330		
Benzoic Acid	EPA CLP SOW[c]					50	1600		
bis(2-Choroethoxy)methane	EPA CLP SOW[c]					10	330		
2,4-Dichlorophenol	EPA CLP SOW[c]					10	330		
1,2,4-Trichlorobenzene	EPA CLP SOW[c]					10	330		
Naphthalene	EPA CLP SOW[c]					10	330		
4-Chloroanaline	EPA CLP SOW[c]					10	330		
Hexachlorobutadiene	EPA CLP SOW[c]					10	330		
4-Chloro-3-methylphenol	EPA CLP SOW[c]					10	330		
2-Methylnaphthalene	EPA CLP SOW[c]					10	330		
Hexachlorocyclopentadiene	EPA CLP SOW[c]					10 ug/L	330 ug/Kg[b]		
2,4,6-Trichlorophenol	EPA CLP SOW[c]					10	330		
2,4,5-Trichlorophenol	EPA CLP SOW[c]					50	1600		
2-Chloronaphthalene	EPA CLP SOW[c]					10	330		
2-Nitroanaline	EPA CLP SOW[c]					50	1600		
Dimethylphthalate	EPA CLP SOW[c]					10	330		
Acenaphthylene	EPA CLP SOW[c]					10	330		
2,6-Dinitrotoluene	EPA CLP SOW[c]					10	330		
3-Nitroaniline	EPA CLP SOW[c]					50	1600		
Acenaphthene	EPA CLP SOW[c]					10	330		
2,4-Dinitrophenol	EPA CLP SOW[c]					50	1600		
4-Nitrophenol	EPA CLP SOW[c]					50	1600		
Dibenzofuran	EPA CLP SOW[c]					10	330		
2,4-Dinitrotoluene	EPA CLP SOW[c]					10	330		
Diethylphthalate	EPA CLP SOW[c]					10	330		
4-Chlorophenol Phenyl ether	EPA CLP SOW[c]					10	330		
Fluorene	EPA CLP SOW[c]					10	330		
4-Nitroanaline	EPA CLP SOW[c]					50	1600		
4,6-Dinitro-2-methylphenol	EPA CLP SOW[c]					50	1600		
N-nitrosodiphenylamine	EPA CLP SOW[c]					10	330		
4-Bromophenyl Phenyl ether	EPA CLP SOW[c]					10	330		
Hexachlorobenzene	EPA CLP SOW[c]					10	330		
Pentachlorophenol	EPA CLP SOW[c]					50	1600		
Phenanthrene	EPA CLP SOW[c]					10	330		
Anthracene	EPA CLP SOW[c]					10 ug/L	330 ug/Kg[b]		

ANALYTICAL METHODS, DETECTION LIMITS, AND DATA QUALITY OBJECTIVES

Analyte	Method	SW	GW	BOREHOLE	SED	Required Detection Limits Water	Required Detection Limits Soil/Sed.	Precision Objective	Accuracy Objective
Target Compound List - Semi-Volatiles (continued)			X[u]	X	X			WATER/SOIL	WATER/SOIL
Di-n-butylphthalate	EPA CLP SOW[c]					10	330	**	***
Fluoranthene	EPA CLP SOW[c]					10	330		
Pyrene	EPA CLP SOW[c]					10	330		
Butyl Benzylphthalate	EPA CLP SOW[c]					10	330		
3,3'-Dichlorobenzidine	EPA CLP SOW[c]					20	660		
Benzo(a)anthracene	EPA CLP SOW[c]					10	330		
Chrysene	EPA CLP SOW[c]					10	330		
bis(2-ethylhexyl)phthalate	EPA CLP SOW[c]					10	330		
Di-n-octyl Phthalate	EPA CLP SOW[c]					10	330		
Benzo(b)fluoranthene	EPA CLP SOW[c]					10	330		
Benzo(k)fluoranthene	EPA CLP SOW[c]					10	330		
Benzo(a)pyrene	EPA CLP SOW[c]					10	330		
Indeno(1,2,3-cd)pyrene	EPA CLP SOW[c]					10	330		
Dibenz(a,h)anthracene	EPA CLP SOW[c]					10	330		
Benzo(g,h,i)perylene	EPA CLP SOW[c]					10	330		
Target Compound List - Pesticides/PCBs			X[u]	X	X			WATER/SOIL (%RPD)	WATER/SOIL (% Recovery)
alpha-BHC	EPA CLP SOW[c]					0.05 ug/L	8.0 ug/Kg[3]	**	***
beta-BHC	EPA CLP SOW[c]					0.05	8.0		
delta-BHC	EPA CLP SOW[c]					0.05	8.0		
gamma-BHC (Lindane)	EPA CLP SOW[c]					0.05	8.0		
Heptachlor	EPA CLP SOW[c]					0.05	8.0		
Aldrin	EPA CLP SOW[c]					0.05 ug/L	8.0 ug/Kg[3]		
Heptachlor Epoxide	EPA CLP SOW[c]					0.05	8.0		
Endosulfan I	EPA CLP SOW[c]					0.05	8.0		
Dieldrin	EPA CLP SOW[c]					0.10	16.0		
4,4'-DDE	EPA CLP SOW[c]					0.10	16.0		
Endrin	EPA CLP SOW[c]					0.10	16.0		
Endosulfan II	EPA CLP SOW[c]					0.10	16.0		
4,4'-DDD	EPA CLP SOW[c]					0.10	16.0		
Endosulfan Sulfate	EPA CLP SOW[c]					0.10	16.0		
4,4'-DDT	EPA CLP SOW[c]					0.10	16.0		
Methoxychlor	EPA CLP SOW[c]					0.5	80.0		
Endrin Ketone	EPA CLP SOW[c]					0.10	16.0		
alpha-Chlordane	EPA CLP SOW[c]					0.5	80.0		
gamma-Chlordane	EPA CLP SOW[c]					0.5	80.0		
Toxaphene	EPA CLP SOW[c]					1.0	160.0		

ANALYTICAL METHODS, DETECTION LIMITS, AND DATA QUALITY OBJECTIVES

Analyte	Method	SW	GW	BOREHOLE	SED	Required Detection Limits Water	Required Detection Limits Soil/Sed.	Precision Objective	Accuracy Objective
Target Compound List - Pesticides/PCBs (continued)			X[u]	X	X			WATER/SOIL (%RPD)	WATER/SOIL (% Recovery)
AROCLOR-1016	EPA CLP SOW[c]					0.5	80.0		
AROCLOR-1221	EPA CLP SOW[c]					0.5	80.0		
AROCLOR-1232	EPA CLP SOW[c]					0.5	80.0		
AROCLOR-1242	EPA CLP SOW[c]					0.5	80.0		
AROCLOR-1248	EPA CLP SOW[c]					0.5	80.0		
AROCLOR-1254	EPA CLP SOW[c]					1.0	160.0		
AROCLOR-1260	EPA CLP SOW[c]					1.0	160.0	(Replicate Analyses)	(Laboratory Control Sample)
RADIONUCLIDES									
Gross Alpha	f,g,h,i,k,l,m,n,s	X[f,u]	X[f]	X	X	2 pCi/L	4 pCi/g	**	***
Gross Beta	f,g,h,i,k,l,m,n,s	X[f,u]	X[f]	X	X	4 pCi/L	10 pCi/g		
Uranium 233+234	f,h,i,m,l,n,s	X[f,u]	X[f]	X	X	0.6 pCi/L	0.3 pCi/g		
Uranium 235,238	f,h,i,l,m,n,s	X[f,u]	X[f]	X	X	0.6 pCi/L	0.3 pCi/g		
Americium 241	i,l,p,q,s	X[f,u]	X[f]	X	X	0.01 pCi/L	0.02 pCi/g		
Plutonium 239+240	i,l,o,p,s	X[f,u]	X[f]	X	X	0.01 pCi/L	0.03 pCi/g		
Tritium	f,g,h,i,l,m,s	X[u]	X[u]	X	X	400 pCi/L	400 pCi/L		
Strontium 89,90	f,h,i,l,m,s			X	X	NA	1 pCi/g		
Strontium 90 only	f,h,i,l,m,s	X[f,u]	X[f]			1 pCi/L	NA		
Cesium 137	h,i,l,m	X[f,u]	X[f]	X	X	1 pCi/L	0.1 pCi/g		
Radium 226	f,g,h,i,l,m[5],s	X[f,u]	X[f]			0.5 pCi/L	0.5 pCi/g		
Radium 228	f,g,h,i,l,m[5],s	X[f,u]	X[f]			1 pCi/L	0.5 pCi/g		
SURFICIAL SOIL SAMPLING PARAMETERS									
Total Organic Carbon	ALPHA 5310[1]						1 mg/kg	**	***
Carbonate	EPA 310.1[d]						2 mg/kg		
pH	EPA 150.1[d]						0.1 pH units		
Specific Conductance	EPA 120.1[1]						2.5 umho/cm		
Plutonium 239+240	i,l,o,p,s						0.03 pCi/g		
Americium 241	i,l,p,q,s						0.01 pCi/g		
Uranium 233,234,235,238	f,h,i,l,m,n,s						0.06 pCi/g		

ANALYTICAL METHODS, DETECTION LIMITS, AND DATA QUALITY OBJECTIVES

Analyte	Method	SW	GW	BOREHOLE	SED	Readability Objective	Accuracy
FIELD PARAMETERS							
pH	1	X	X			± 0.1 pH unit	± 0.2 pH units
Specific Conductance	1	X	X			2.5 umho/cm[1] 25 umho/cm[2] 250 umho/cm[3]	± 2.5% max. error at 500, 5000, 50000 umhos/cm plus probe; ± 3.0% max error at 250, 2500, and 25000 plus probe accuracy of ± 2.0%.
Temperature	1	X	X			± 0.1°C	± 1.0°C
Dissolved Oxygen	1	X				± 0.1 mg/L	± 10%

ANALYTICAL METHODS, DETECTION LIMITS, AND DATA QUALITY OBJECTIVES

* For samples collected from IHSSs 102 and 105 only [BH01,BH02,BH03,BH04,BH05,BH06,BH07,BH08 (MW33),BH09,BH15,BH16,BH17,BH18,MW01,MW02,MW03,MW33 (BH08)].
** Precision objective = control limits specified in referenced method and/or Data Validation Guidelines.
*** Accuracy objective = control limits specified in referenced method (in GRRASP for radionuclides).
F = Filtered
U = Unfiltered
1. Measured in the field in accordance with instrument manufacturer's instructions. The instruments to be used are specified in Section 12.
2. Medium soil/sediment required detection limits for pesticide/PCB TCL compounds are 15 times the individual low soil/sediment required detection limit.
3. Detection limits listed for soil/sediment are based on wet weight. The detection limits calculated by the laboratory for soil/sediment, calculated on dry weight basis as required by the contract, will be higher.
4. Higher detection limits may only be used in the following circumstance: If the sample concentration exceeds five times the detection limit of the instrument or method in use, the value may be reported even though the instrument or method detection limit may not equal the required detection limit. This is illustrated in the example below:

   For lead:

   Method in use - ICP
   Instrument Detection Limit (IDL) - 40
   Sample Concentration - 220
   Required Detection Limit (RDL) - 3

   The value of 220 may be reported even though the instrument detection limit is greater than the RDL.

   Note: The specified detection limits are based on a pure water matrix. The detection limits for samples may be considerably higher depending on the sample matrix.
5. If gross alpha > 5 pCi/L, analyze for Radium 226; if Radium 226 > 3 pCi/L, analyze for Radium 228.
6. The detection limits presented were calculated using the formula in N.R.C. Regulatory Guide 4.14, Appendix Lower Limit of Detection, pg. 21, and follow:

$$LLD = \frac{4.66\ (BKG/BKG\ DUR)^{1/2}}{(2.22)(Eff)(CR)(SR)(e^{-\lambda t})(Aliq)}$$

$$MDA = \frac{4.66\ (BKG/Sample\ DUR)^{1/2}}{(2.22)(Eff)(CR)(SR)e^{-\lambda t}(Aliq)}$$

Where:

LLD = Lower Limit of Detection in pCi per sample unit.
BKG = Instrument Background in counts per minute (CPM).
Eff = Counting efficiency in cpm/disintegration per minute (dpm).
CR = Fractional radiochemical yield.
SR = Fractional radiochemical yield of a known solution.
λ = The radioactive decay constant for the particular radionuclide.
t = The elapsed time between sample collection and counting.
Aliq = Sample volume.
BKG DUR = Background count duration in minutes.

MDA = Minimum Detectable Activity in pCi per sample unit
BKG = same as for LLD
Eff = same as for LLD
CR = same as for LLD
SR = same as for LLD
λ = same as for LLD
t = same as for LLD
Aliq = same as for LLD
Sample DUR = sample count duration in minutes

ANALYTICAL METHODS, DETECTION LIMITS, AND DATA QUALITY OBJECTIVES

7. On 500 umho/cm range.
8. On 5000 umho/cm range.
9. On 50000 umho/cm range.

a. U.S. Environmental Protection Agency Contract Laboratory Program Statement of Work for Inorganics Analysis, Multi-Media, Multi-Concentration, 7/88 (or latest version).

b. U.S. Environmental Protection Agency Contract Laboratory Program Statement of Work for Inorganics Analysis, Multi-Media, Multi-Concentration, 7/88 (or latest version). The specific method to be utilized is at the laboratory's discretion provided it meets the specified detection limit.

c. U.S. Environmental Protection Agency Contract Laboratory Program Statement of Work for Organic Analysis, Multi-Media, Multi-Concentration, 2/88 (or latest version).

d. Methods are from "Methods for Chemical Analysis of Water and Wastes," U.S. Environmental Protection Agency, 1983, unless otherwise indicated.

e. Methods are from "Test Methods for Evaluation of Solid Waste, Physical/Chemical Methods," (SW-846, 3rd Ed.), U.S. Environmental Protection Agency.

f. U.S. Environmental Protection Agency, 1979, Radiochemical Analytical Procedures for Analysis of Environmental Samples, Report No. EMSL-LY-0539-1, Las Vegas, NV, U.S. Environmental Protection Agency.

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TITLE: APPENDIX C

Approved By:

Director, Environmental Management 5/7/91

APPENDIX C

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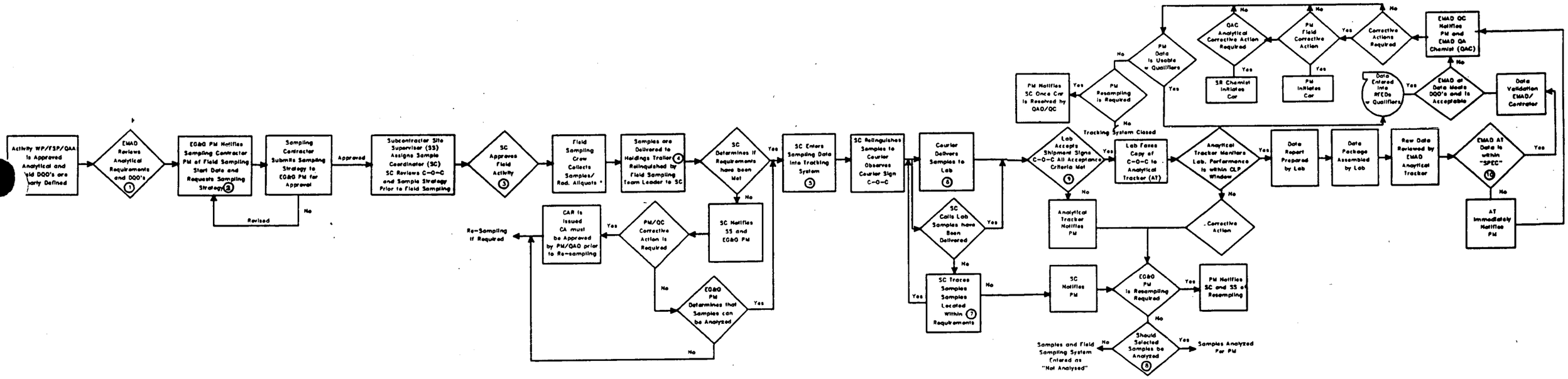


(1) EMAD Reviews Analytical Requirements to Determine if GRASSP Specifications and Analytical Capability Exist. Modifications May be Required by EMAD Prior to Field Sampling.

(2) Sampling Strategy is Based on the WP/FSP/QAA and EG&G SOPs and Includes Sample Schedule and Sample Collection, Preservation and RAD Screening Methods. The Subcontractor Site Supervisor Identifies Their Field Tracker Who is Responsible for Field QA, Sample Tracking from Field to the Lab, and Assignment of Sample Numbers Per SOP 1.13 Sample Handling.

(3) SC Reviews C-O-C, Preservation, Turn-Around, Equipment, Rad. Screenings, Container Requirements, C-O-C Tape, Condition of Container

(4) Field Crew Relinquises C-O-C SC Recieves Samples by Signing and Date/Time Recordings on C-O-C After Reviewing to Determine if all Sampling and C-O-C Requirements have been Met.

(5) Field Tracking Data

(6) Lab Accepts Shipment, Observes Courier Sign C-O-C Relinquishing Samples to Lab. Lab QC signs C-O-C Accepting Samples

(7) Shipment and Samples are Still within Time and Temp/Preservation Limits and can Still be Sent Lab C-O-C not Broken

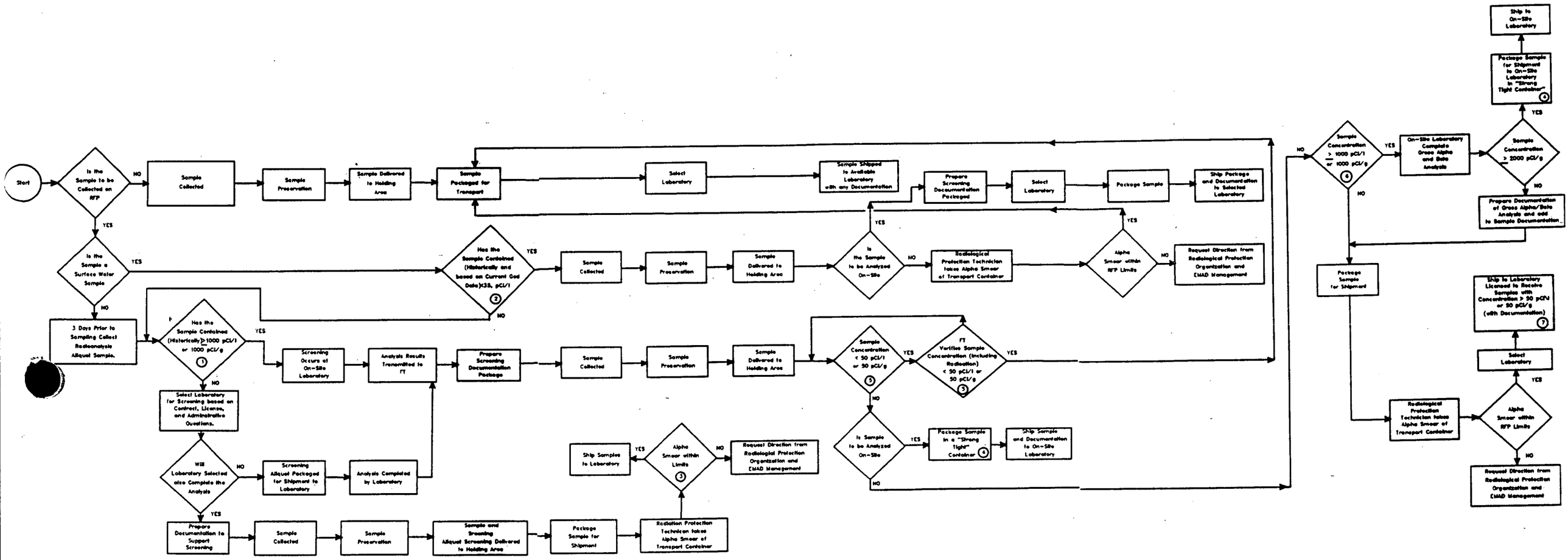
* Note: See Figure ___ and Discussion in Section ___ for Radiological Screenings Flow

(8) The PM May Determine that some or all of Samples may Need to be Analyzed and the Data Useful even Though Qualified U or R

(9) Custody Seals Intact Sample Labels/COC, AGREE Temp within Specification, other Problems

(10) Field QCs are Reviewed to Determine Samples Met DQO's

Figure 8-1 Sample collection, analysis and chain-of-custody flow



Note: For activity concentration specified as "pCi/l or pCi/g" the pCi/l apply to liquid samples and the pCi/g apply to solid samples (e.g. soil samples).

① Samples are initially Evaluated based on Historical Data to Determine if the Activity Concentration is above 1000 pCi/g. If a Sample Result Provides an indication that the Sample Exceeds 1000 pCi/l or 1000 pCi/g (as Applicable) the Historical Determination will be Re-evaluated.

② Surface Water Sample Data will be Reviewed and an Historical Basis is Established to Determine if the Activity Concentration in the Sample is likely to Exceed 35 pCi/l. If a Sample Result Provides an indication that the Sample may Exceed this Value this Historical Determination will be Re-evaluated.

Note: For activity concentration specified as "pCi/l or pCi/g" the pCi/l apply to liquid samples and the pCi/g apply to solid samples (e.g. soil samples).

③ Alpha Smear are Taken of the Transport Container for Radiological Protection and Off-Site Release (Use Field Survey Instruments see SOP 1.18). These Measurements are not part the Actual Screening Process.

④ A "Strong Tight" Container is Required by DOT and DOE for Off-Site Shipments of Radioactive Material and is appropriate for all On-Site Samples to Protect the Container (e.g. See 49(FR173.421).

⑤ The "50 pCi/l or 50 pCi/g" Limit Assures Compliance with DOE Order 541015.

Note: Activity Concentration Specified as "pCi/l or pCi/g" are Limits for Liquid and Solid (e.g. Soils) Samples Respectively.

⑥ Based on DOT definition of radioactive material (49 CFR 173.403).

⑦ Shipment must be Consistant with Laboratories Contract and License.

Figure 8-2 Radiological Screening of Field Samples